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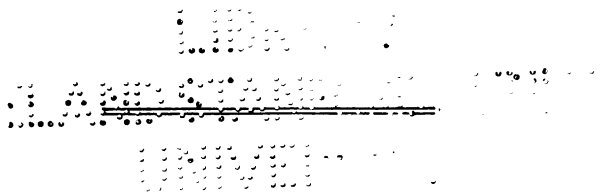

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ERRATA.

Page 30, line 18 (from top), for "*Cyclidinus velutinus*," read "*Cyclidius velutinus*."
„ 108, line 18 (from bottom), for "Genus 19. *alternans*, sp. n.," read "Genus 18. *alternans*, sp. n."
„ 148, line 6 (from bottom) and page 150, line 14 (from bottom), for "Yahrb." read "Jahr."
„ 222, line 22 (from top), for "*Victorina Frayja*," read "*Victorina Trayja*."
„ 222, lines 1 and 4 (from bottom), and page 223, lines 7, 12 and 14 (from top), for "*E. Aciphera*," read "*E. Aliphera*."
„ 223, line 8 (from bottom), for "*Gynæsia*," read "*Gynæcia*."
„ 307, line 1 (from top), after "*Copidita lateralis*," add "sp. n."

IN THE JOURNAL OF PROCEEDINGS.

Page ii, line 2 (from top), for "Santa Caterina," read "Santa Catharina."
„ v, line 6 (from bottom), for "*Chærocampa elpenor*," read "*Chærocampa porcellus*."
„ xxv, line 8 (from top), for "*Sonizoneura*," read "*Schizoneura*."
„ xxv, line 10 (from bottom), for "simple egg," read "single egg."
„ xxvi, line 9 (from top), for "*Vaccuna dryophile*," read "*Vaccuna dryophila*."
„ xlviii, line 13 (from bottom), for "affected," read "effected."
„ liii, line 13 (from top), for Waterton's "Essays on Natural History," read "Wanderings in South America."

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THE

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1878.

I. *Descriptions of new species of Hymenopterous Insects from New Zealand, collected by* Prof. HUTTON, *at Otago.* By FREDERICK SMITH.

[Read December 5th, 1877.]

SEVENTEEN new species of *Hymenoptera* are described in this paper; one belonging to the *Tenthredinidæ*, twelve to the *Ichneumonidæ*, one to the *Formicidæ*, one to the *Pompilidæ*, one to the *Crabronidæ*, and one to the *Andrenidæ*. As well as I have been able to ascertain, the number of previously-described species is fifty-one, thus bringing the total up to sixty-eight. The collection made by Prof. Hutton consisted of twenty-three species, four of which have been previously described; two are reserved for future examination.

TENTHREDINIDÆ.

Fam. UROCERIDÆ.

Xiphydria flavo-picta.

Male.—Length 4 lines. Ferruginous, the head and thorax variegated with yellow; the sixth, seventh and eighth segments of the abdomen black. Antennæ black, with the two basal segments ferruginous. The head yellow; a broad ferruginous stripe from the posterior

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margin of the vertex to a little beyond the ocelli; an angulated ferruginous spot at the sides of the vertex touching the eyes; and three small ones at the insertion of the neck. The posterior margin of the prothorax yellow; the mesothorax with two oblique stripes inclining inwardly and uniting at its posterior margin, a lunate spot on each side of the scutum, two ovate ones at the base of the metathorax and three small ones at its apex, yellow; a large oblong spot beneath the wings, and the legs, yellow; wings pale fulvo-hyaline and splendidly iridescent; the tarsi pale ferruginous.

ICHNEUMONIDÆ.

ICHNEUMONIDES.

Cryptus penetrator.

Length 4 lines. Head and thorax black, legs and abdomen ferruginous. The orbits of the eyes, slightly interrupted at their summit, the anterior margin of the clypeus and the mandibles, yellow; a ferruginous spot on the scape of the antennæ in front. Thorax: the margins of the prothorax and the tegulæ yellow; the anterior and intermediate coxæ and trochanters yellow in front; wings subhyaline and iridescent; the stigma ferruginous. Abdomen smooth and shining, the apical margin of the first segment yellow.

OPHIONIDES.

Ophion ferrugineus.

Length 6 lines. Ferruginous, smooth and shining. A narrow yellow line on the lower portion of the inner orbit of the eyes and a broader one behind them, not extending to their summit. Thorax: the tubercles, and a large spot above both the intermediate and posterior coxæ, as well as the scutellum, bright yellow; the spots above the posterior coxæ are tuberculate; wings hyaline and iridescent, the nervures black, the stigma ferruginous. The apical segments of the abdomen slightly fusco-ferruginous.

Ophion inutilis.

Female.—Length 4 lines. Ferruginous, the eyes and tips of the mandibles black. Thorax shining; the mesothorax finely punctured; the metathorax opaque and

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finely rugulose; wings hyaline and iridescent, the nervures and stigma ferruginous; the legs paler than the thorax, except the coxæ, with the claws and pulvillus black. Abdomen smooth and shining, darkest towards the apex.

Paniscus ephippiatus.

Female.—Length 6 lines. Ferruginous, with the eyes, mesothorax and apex of the abdomen, black. The apical portion of the antennæ fuscous; the tips of the mandibles black. Thorax: the sternum black; wings hyaline, the nervures and stigma fuscous; the scutellum prominent, oblong, narrowed towards the apex, and with the sides margined; the metathorax finely transversely striated. The abdomen beyond the first segment fusco-ferruginous; darkest at the apex.

TRYPHONIDES.

Scolobates varipes.

Female.—Length 2½ lines. Head and thorax black; abdomen red in the middle. The inner orbit of the eyes with a narrow ferruginous line; the mandibles and palpi pale testaceous; the antennæ ferruginous. The wings fulvo-hyaline, the nervures and stigma ferruginous. The mesothorax smooth and shining; the margin of the prothorax laterally white, as well as the tegulæ; the scutellum white; the legs ferruginous; the posterior tibiæ black at the base to about one fourth of their length, then one fourth white, another fourth black, the apical portion ferruginous. One fourth of the length of the abdomen in the middle ferruginous; the posterior tarsi black.

Scolobates intrudens.

Female.—Length 3 lines. Black, with pale anterior and intermediate legs. Mandibles and palpi pale yellow; the antennæ a little longer than the body. Thorax, subopaque; the wings hyaline, the nervures and stigma black, the tegulæ with a white spot; the anterior and intermediate coxæ and all the trochanters, yellow; the anterior and intermediate femora and tibiæ pale ferruginous; the tarsi more or less fuscous; the posterior tibiæ pale beneath; abdomen shining black; the ovipositor nearly as long as the head and thorax.

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Tryphon obstructor.

Length 2¾ lines. Head and thorax black, abdomen red and black. The mandibles and palpi pale testaceous, as are also the anterior and intermediate coxæ and trochanters; the legs otherwise red. The thorax opaque, and with the metathorax, the sides and beneath covered with a fine, thin, sericeous pile; wings subhyaline, the nervures and stigma fuscous, the tegulæ with a white spot. The three basal segments of the abdomen black, with their apical margins ferruginous; the following segments with an oblong quadrate black spot in the middle, extending to about two-thirds of the length of the segments.

What I think is probably a variety of this species has the posterior coxæ black.

PIMPLIDES.

Lissonota flavo-picta.

Length 4—5 lines; of the ovipositor 6 lines. Ferruginous, the head and thorax spotted with yellow. Head, the orbits of the eyes, the clypeus and the mandibles yellow, the latter black at their tips. The mesothorax with two narrow longitudinal lines which widen anteriorly into an angulated shape, the prothorax with two longitudinal stripes at the sides, an oblong broad stripe beneath the wings and all the coxæ above, yellow; the scutellum, postscutellum, a minute spot on each side of the metathorax above, another in the middle of its posterior margin, and a broad stripe on its sides, yellow; the metathorax transversely finely aciculate; wings hyaline, the stigma ferruginous. Abdomen smooth and shining.

The male is smaller, usually three and a half lines long, is coloured like the female, but has the face entirely yellow.

Lissonota albo-picta.

Length 3—4 lines. Ferruginous, with the head black. The head with the orbits of the eyes white; the mandibles white at their base. Thorax: a central longitudinal black line on the mesothorax, and a narrow interrupted white one on each side of it, which expands anteriorly into a subtriangular shape; a large ovate spot beneath the wings, and two or three small ones before it, two being on the

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sides of the prothorax, an oblong spot, at the side of the metathorax and the scutellum, white; the metathorax finely wrinkled transversely; wings hyaline and brightly iridescent; the stigma and nervures black; the two apical joints of the tarsi black. Abdomen clavate, with the apical joints fuscous.

The female is not known, the male resembles that of *L. flavo-picta*, but is certainly a distinct species.

BRACONIDÆ.

Rhogadides.

Rhogas penetrator.

Female.—Length 3 lines. Black, with the anterior and intermediate legs pale testaceous yellow. The antennæ as long as the body; the front and the mandibles obscurely ferruginous, as is also the thorax above; the three longitudinal lobes of the mesothorax black; the scutellum and greater portion of the metathorax also black, the apex of the latter ferruginous; the metathorax rugose; wings hyaline and iridescent, the nervures and stigma black; the anterior and intermediate legs with the coxæ black, and also the claw-joint of the tarsi; the posterior coxæ very large, and transversely rugose. Abdomen smooth and shining; the ovipositor about as long as the insect.

Fam. PROCTOTRUPIDÆ.

Proctotrupes intrudens.

Female.—Length 2½ lines. Black, with the legs ferruginous, the apical joints of the tarsi fuscous. The mesothorax smooth and shining, as is also the scutellum; the metathorax coarsely rugose, and having at its base, in the middle, a deep longitudinal channel, which extends to half its length; at the commencement of the channel, on each side, a deep fossulet; the coxæ more or less fuscous or black. Abdomen very smooth and shining; in some examples the apex rufo-piceous.

Var. the scape of the antennæ rufo-piceous.

In some specimens a fine silky down is observable on the mesothorax.

This species was found among a collection of *Coleoptera*, made by Mr. Wakefield in the Canterbury district.

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Spilomicrus quadriceps.

Length 1¼ lines. Head and thorax shining and nigro-æneous; abdomen black. Head quadrate, punctured, most closely so at the sides of the vertex. Thorax punctured, and with a suture crossing between the tegulæ; an impressed curved line runs from the suture on each side, diverging outwardly to the anterior margin of the mesothorax; a shorter line running between it and the tegulæ; the scutellum punctured; the metathorax pubescent, and having a deep central longitudinal depression; posteriorly emarginate, the angles of the emargination produced and acute; wings pale, fulvo-hyaline and iridescent; the stigma black, the nervures at the base pale testaceous; legs black, with the base and apex of the joints ferruginous. Abdomen black, smooth, shining and impunctate; the petiole with two longitudinal impressed lines.

Fam. FORMICIDÆ.

Formica Zealandica.

Female.—Length 2½ lines. The abdomen black, the head and thorax blackish-brown, covered with a fine cinereous pile, which is most dense on the abdomen; the mandibles, the scape of the antennæ and the flagellum at their base and apex pale rufo-testaceous. Thorax ovate, smooth and shining; the metathorax obliquely truncate; the femora rufo-fuscous, with their apex, the tibiæ and tarsi pale rufo-testaceous; the tibiæ usually more or less fuscous in the middle. Abdomen ovate, shining, and with the margins of the segments very narrowly testaceous; the scape of the petiole ovate and emarginate above.

Fam. POMPILIDÆ.

Priocnemis nitidiventris.

Female.—Length 4½ lines. Jet black; the abdomen smooth, shining and impunctate. The head very finely and closely punctured, with larger shallow punctures thinly interspersed; a little cinereous pubescence on the sides of the face below the antennæ; the anterior margin of the clypeus rounded; the tips of the mandibles ferruginous. The thorax *very delicately* punctured; the legs, with the spines at the apex of the tibiæ, black, and the

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tips of the claws of the tarsi rufo-piceous; the wings hyaline, the nervures black. Abdomen smooth and shining, with the apical segment, except its extreme base, finely rugose and opaque.

Fam. CRABRONIDÆ.

Rhopalum albipes.

Male.—Length 4¼ lines. Black; with the posterior tarsi white. Head subquadrate, a little wider than the thorax, and slightly shining; the clypeus with silvery-white pubescence; the scape of the antennæ yellow in front; an impressed line runs from the anterior ocellus to the insertion of the antennæ. Thorax slightly shining; the scutellum, and the enclosed space at the base of the metathorax, *very finely punctured*, the latter with a central impressed line, which unites with a deep fossulet that extends to the apex of the metathorax, the sides of which have a little thin white pubescence; the tubercles yellow; the wings hyaline, the nervures testaceous, with the costal and the stigma brownish-black; the tips of the anterior and intermediate femora, the tibiæ and tarsi pale rufo-testaceous, the tibiæ with a dark stain in the middle; the claw-joint of all the tarsi rufo-piceous; the posterior tibiæ clavate, white at their base, as well as the second, third and fourth joint of the tarsi. Abdomen smooth and shining; the petiole clavate.

Fam. ANDRENIDÆ.

Dasycolletes hirtipes.

Female.—Length 5 lines. Black; the pubescence fulvous. The front with long dense pubescence, that on the cheeks pale fulvous. The mesothorax shining, thinly pubescent and not very closely punctured; the pubescence more dense on the scutellum and metathorax; the wings hyaline and iridescent; the legs with fulvous pubescence, the posterior tibiæ with a dense scopa, and also a floccus on the trochanters; the apical joints of the tarsi rufo-testaceous. Abdomen shining and impunctate; the apical margins of the segments slightly testaceous; the fifth segment with a fimbria of bright fulvous pubescence; the apical segment, with an opaque naked space, the sides pubescent.

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II. *Descriptions of eight new species, and a new genus of* Cossonides *from New Zealand.* By D. Sharp.

[Read December 5th, 1877.]

In this paper I have drawn up short descriptions of eight new species of *Cossonides* from New Zealand; they are all from the province of Auckland, and are due to the researches of Captain Thos. Broun and Mr. Thos. Lawson. They offer another proof of the excessive difficulty that exists in dealing satisfactorily with genera in face of our present very limited knowledge of the existing species of *Coleoptera*. Being anxious to avoid making new generic names, I have allowed myself to do so for one only of the eight species, *Entium aberrans*, a minute and feeble *Cossonid*, to be placed probably near *Pentarthrum* and *Sericotrogus* in Mr. Wollaston's arrangement, but differing from those insects by the approximate anterior coxæ and feeble tibial hooks. The remarkable *Pentarthrum Wollastonianum*, and its ally *Pentarthrum debile*, might, perhaps, with advantage have been treated as a distinct genus differentiated from *Pentarthrum* by the form of the head, the eyes being remote from the neck; in that case the closely-allied Hawaian *Pentarthrum prolixum* must have been associated with them. In the case of *Sericotrogus simulans* and *Sericotrogus setiger*, the characters I have pointed out might be considered to call for the establishment of two new genera; but as I feel sure that our knowledge of the New Zealand *Cossonides* is yet quite in its early stages, and as I fancy that any competent entomologist, having these two species before him, would *à priori* have suggested to him a relationship with *Sericotrogus subœnescens*, I have left them with that species under the one generic name.

Pentarthrum Wollastonianum, n. sp. Perelongatum, angustum, subdepressum, subnitidum, subtiliter punctatum, piceo-ferrugineum; oculis a collo remotis; prothorace sat elongato, antrorsum fortiter angustato, ad marginem anteriorem levissime constricto, crebre subtiliter punctato,

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dorso plano; elytris valde elongatis, subtiliter seriatim punctatis, et transversim rugulosis, apice extremo brevissime setigero. Long. exc. rost. 3½—4½ mm., lat. vix 1 mm.

Mas., capite rostroque dilatatis.

Fem., capite rostroque gracilibus.

In this species the head and rostrum of the male are very thick, and are rather closely and evenly punctured; the rostrum is dilated at the extremity, and only a little longer than the head; in the female the rostrum is rather slender, and is twice as long as the head; in each sex the antennæ are inserted near the eyes, so that in the female the portion of the rostrum in front of the point of insertion is three or four times as long as the part between the insertion and the eyes; the 2nd joint of the funiculus is not at all longer than the following ones; the thorax is very little contracted at the base; the sculpture of the elytra is peculiar, consisting of fine series intermediate between punctures and striæ, with distinct transverse rugæ. The development of the head and rostrum in the male sex varies much, so that in some individuals it is not much thicker than in the female.

I have named this very remarkable species in honour of the able author of the paper, "On the Genera of *Cossonidæ*," published by the Entomological Society of London four years ago. A large colony of the species seems to have been discovered recently by Mr. Thos. Lawson at Auckland.

Pentarthrum debile, n. sp. Elongatum, angustum, subdepressum, nitidum, ferrugineum; oculis a collo remotis; prothorace minus elongato, antrorsum fortiter angustato, ad marginem anteriorem leviter constricto, crebre, fortiter punctato; elytris sat fortiter punctato-striatis, apice brevissime setigero. Long. 2½ mm.

This little species in all its characters closely approaches the *Pentarthrum Wollastonianum*, but it is very much smaller, and the sculpture of the thorax and elytra is coarser, the latter being, however, nearly destitute of transverse rugæ; the form of the head and rostrum is similar in the two species, but in the male of *P. debile*, the incrassation of these parts does not attain such an extreme point as it does in *P. Wollastonianum*. The point of insertion of the antennæ is not so near the eye

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in *P. debile*, it being in the male just about the middle of the rostrum, in the female a little behind it.

For this species I am also indebted to Mr. R. Lawson, who recently received it from his brother, with the *P. Wollastonianum*.

Pentarthrum parvicorne, n. sp. Brevius, subdepressum, sat nitidum, ferrugineum, fortiter punctatum; prothorace elongato, antrorsum fortiter angustato, pone marginem anteriorem leviter constricto, lateribus versus basin evidenter rotundatis et angustatis, crebrius fortiter punctato; elytris sat fortiter striato-punctatis, interstitiis punctulatis. Long. 2 mm.

In this species the eyes are prominent and quite near the neck; the 2nd joint of the funiculus is not longer than the following ones, the 3rd tarsal joint is distinctly larger than the 2nd and bilobed, though the lobes are not large; the sculpture of the elytra takes the form of series of rather coarse punctures which are somewhat depressed, so that the elytra might almost be said to be striate, the interstices appear a little rough, and on examination with a very good glass are seen to bear excessively short indistinct setæ; all the portion of the rostrum in front of the antennal insertion is broader than the posterior portion, and the antennæ are inserted about the middle. The rostrum is thick especially in the male, and in that sex it is opaque; in the female it is rather longer, more slender and more shining, and is nearly as long as the thorax behind the constriction.

Auckland; the male sent by Captain Broun, the female by Mr. R. Lawson.

Pentarthrum remotum, n. sp. Brevius, robustulum, subdepressum, sat nitidum rufo-piceum, antennis clava elongata, nigra; prothorace lateribus rotundatis, antrorsum angustato, pone marginem anteriorem depresso, crebrius fortiter punctato, dorso subdepresso, medio ad basin subfoveolato; elytris prothorace paulo latioribus, fortiter punctato striatis. Long. 2—2½ mm.

This little species is easily recognizable by the club of the antennæ, which is elongate, so that it quite equals in length all the rest of the funiculus, and it is also darker in colour than the other joints, and entirely covered with fine pubescence. In each sex the rostrum is rather

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shining; in the male it is very broad; in the female it is a good deal more slender, though still rather stout; in each sex the point of insertion of the antennæ is a little before the middle; the 2nd joint of the funiculus is quite small.

This species was sent me by Captain Broun, from Tairua, as No. 324.

Pentarthrum brevirostre, n. sp. Brevius, robustulum, minus depressum, fortiter punctatum; rostro brevi, crasso, parallelo, opaco; prothorace elongato, lateribus rotundatis, antrorsum angustato, pone marginem anteriorem depresso, dense, fortiter, profundeque punctato, subopaco; elytris sat nitidis, prothoracis latitudine, profundius striatis, striis sat distincte punctatis. Long. 2¼ mm.

In this species the club of the antennæ is short, stout, and abruptly marked off, and is either circular or oval according as it is viewed from above or from one side; the 2nd joint of the funiculus scarcely differs from the following ones. I do not know the sex of the individuals before me, but probably they are males.

I have recently received a pair of this species from Captain Broun, as No. 43, accompanied by the information that they were cut out of a log at Whangarei.

Entium aberrans, n. sp. Perdebile, angustum, subcylindricum, sat nitidum, rufescens, setis tenuissimis, sat elongatis vestitis; prothorace angustulo, cylindrico, fortiter crebre punctato, medio longitudinaliter angustissime impunctato; elytris fortiter seriatim punctatis; metasterno elongato. Long. 1⅔ mm. lat. ½ mm.

The rostrum is more than half as long as the thorax, it is rather fine and indistinctly punctured, and like the rest of the upper surface bears fine hairs. The eyes are rather small, oval, and have their greatest length in the longitudinal direction. The thorax is narrow and cylindric, being only very little narrowed in front, and scarcely at all constricted or depressed there, it is coarsely and rather closely punctured, but the punctures become more sparing towards the middle, so that they almost leave a smooth space along the middle line. Elytra elongate and slender, but distinctly broader than the thorax, not at all striate, but with very regular rows of coarse punctures, which at the apex, however, become fine and indistinct. Under surface sparingly punctured and shining, its setæ excessively short.

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I have (as remarked above) given a new generic name to this species; its chief structural characters are as follows. Body clothed with fine hairs; rostrum stout, moderately long, subcylindric; eyes moderately developed; funiculus of antennæ composed of five joints, all of which, except the basal one, are small and slender; the 2nd, however, being a little longer than the following ones; insertion of antennæ near middle of rostrum. Scutellum small but distinct. Front coxæ only very narrowly separated, but middle and hind ones broadly distant. Metasternum very elongate: 1st and 2nd ventral segments elongate. Legs feeble, with slender feeble, linear tibiæ, whose apical uncus is very small. Tarsi small, 4-jointed, 1st and 2nd joints small and short, 3rd rather larger, with slender and short lobes.

Sericotrogus simulans, n. sp. Debilis, angustus, minus elongatus, subtus nigricans, supra pube, depressa, elongata, vestitus, rufo-obscurus, antennis testaceis clava picea, pedibus rufis, femoribus obscurioribus; rostro nitido, subtiliter punctato; prothorace lateribus rotundatis, antrorsum angustato, pone marginem anteriorem leviter depresso, opaco, dense fortiterque sed parum profunde punctato, medio versus basin indistincte depresso; elytris minus profunde striatis, striis fortiter punctatis, interstitio 2° ad apicem paululum acute elevato; corpore subtus sat fortiter punctato; coxis anterioribus valde distantibus. Long. $1\frac{3}{4}$ mm.

This species on account of its colour, sculpture and pubescence, bears a superficial resemblance to *Sericotrogus subænescens;* but it is really extremely distinct therefrom, the rostrum is shining and but little punctate, and differs in structure from that of *S. subænescens*, its basal part being much more constricted; it has also the front coxæ much more widely separated.

I have seen but a single individual, which I had formerly put aside as a very small variety of *S. subænescens*. The specimen is from Auckland, and was sent either by Captain Broun or Mr. Lawson; probably by the former.

Sericotrogus setiger, n. sp. Gracilis, elongatus, angustus, fusco-rufus, per-opacus, setis robustis, depressis, flavis, conspicue vestitus, antennis pedibusque rufis; prothorace, elongato, cylindrico, sed in medio dilatato, pone marginem anteriorem fortiter constricto, obsolete punctato, dorso de-

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planato; elytris elongatis, minus argute punctato-striatis; corpore subtus fortiter punctato. Long. 2½ mm.

This peculiar species at first sight reminds one of a *Styphlus* or *Orthochætes;* it departs structurally in several respects from *Sericotrogus subœnescens*, but may be at present arranged in the same genus with that species; it is of more slender and depressed form; has the rostrum more slender and the head is very much smaller, so that the smooth neck is continued forwards almost directly as the rostrum; the antennæ are more slender, the joints before the club being bead-like instead of transverse; the lobes of the 3rd tarsal joint are remarkably largely developed and distinct; and the hind coxæ are rather more distant; in *Sericotrogus subœnescens* the antennal scrobes are remarkably well developed, and are continued backwards, passing to the under surface of the rostrum, while in *Sericotrogus setiger* they are quite small and indistinct.

I received a specimen of this species a few months ago from Captain Broun; it was found by him at Tairua and labelled 308. A second individual sent by Captain Broun at the same time, and with the same number, belongs doubtfully to this species; it is more rufescent in colour, and has the setæ of the upper surface less developed, and shows also other slight differences in sculpture and structure.

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III. *Descriptions of some new species and a new genus of Rhyncophorous* Coleoptera, *from the Hawaiian Islands.* By D. Sharp.

[Read December 5th, 1877.]

The insects described in this Paper are all due to the indefatigable efforts of the Rev. T. Blackburn, who is at present residing in Honolulu, and is, as far as he can find leisure, bent on ascertaining as thoroughly as possible the nature and extent of the insect fauna of the group of Sandwich Islands.

The Polynesian Islands have been hitherto considered to harbour but very few species of *Coleoptera*, and it remains to be seen to what extent Mr. Blackburn's investigations will confirm the reports of former observers. It may be said, however, already, that the poverty of these Islands in *Coleoptera* is not yet to be accepted. Fairmaire, in his Memoir on the *Coleoptera* of Polynesia, published in 1849, was only able to report 140 species of the family from the whole of the Polynesian Islands, and thought that this number would not be readily increased, for M. Vesco, so he informs us, required several years of research in Tahiti before he could discover 100 species, while Mr. Blackburn has been able, I believe, to amass between two and three hundred species during two seasons collecting in the Island of Oahu. Mr. Blackburn, in the letters I have received from him several times, alludes to the peculiar poverty of specimens of *Coleoptera*. Again and again he has visited a spot where he had formerly found an individual of some species he desired, without being able to discover a second example, so that of the greater part of the species he has discovered he finds it extremely difficult to accumulate anything approaching to a series of individuals. This fact is quite in accordance with the observations of such collectors as have visited these islands; it may, perhaps, be ultimately discovered that the insect inhabitants of this spot having been necessarily confined during a very long period to one small area, have become less fertile than is the case in localities where the obstacles to a considerable change of locality

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are less insuperable; whether there will ultimately prove to be any truth in this supposed correlation between paucity of individuals of a species and small area of distribution, remains to be seen; at any rate it seems *à priori* certain that the probability of breeding between individuals with but small previous kinship must be lessened in a ratio with the diminished area of distribution.

The six species for which I have established the genus *Proterhinus* are of a very interesting nature, though they consist only of insects of small size: they appear to me, as will be seen from the remarks I have made below, to point out that the position of the anomalous *Aglycyderidæ*, should be at the head of the Rhyncophorous series of *Coleoptera*, supposing the arrangement of Dr. Leconte to be a valid one; and though my very limited knowledge of the *Rhyncophora* scarcely justifies me in expressing an opinion, it seems to me that the system of this esteemed American entomologist is very far in advance, and that in the right direction, of any that has been hitherto proposed for this most extensive assemblage of beetles.

Besides the *Proterhini*, I have described ten species belonging to the family *Cossonides*; and as regards these I wish to say that I have not felt called upon to discuss the species of the family previously described from this locality, and for this reason, that I think Mr. Blackburn will be able to discover numerous other species of the family, so that a monograph, or anything like it, had better be deferred for the present. All I need say is, that I think I am justified in considering all these ten species as previously undescribed.

The interesting but very complicated question of the affinities of the Coleopterous fauna of these islands is a point on which I had better defer comment till my knowledge of the species is more complete.

Proterhinus vestitus, n. sp. Fusco-rufus, setis depressis, aliisque erectis vestitus, antennis tibiisque rufis; prothorace antrorsum constricto, basin versus angustato, dorso inæquali, fortiter punctato, opaco; elytris rufescentibus, plus minusve distincte nigro-signatis, squamulis depressis plagiatim vestitis, fortiter sed parum conspicue punctatis, humeris acutis. Long. 2—3 mm.

Antennæ red, about as long as head and thorax, rather slender; 1st and 2nd joints thick, 3rd slender, a good deal longer than the 2nd, the 9th joint evidently a little

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stouter than the 8th, so as to be intermediate in thickness between it and the 10th. Thorax about as long as broad, the front part constricted, the sides behind the constriction curved and much narrowed towards the base; the surface is coarsely punctured and sparingly clothed with yellow, short setæ; it shows some depressions, which are, however, rather ill-defined and variable, the most distinct and constant being one near the front, in the middle. Elytra rather short, reddish, with some irregular black marks, the most distinct of which form a patchy band across the middle; they are clothed with patches of pale setiform scales, and are rather coarsely but somewhat indistinctly punctured, the punctures being scarcely placed in rows: the base is emarginate, so that the shoulders are prominent and acute, and quite disengaged from the base of the thorax: the surface shows, besides the patches of scales, scattered erect setæ. The legs are reddish, with the thicker part of the femora nearly black. The under surface is rough on the front parts; the basal ventral segment is coarsely and distinctly punctured, the other four segments are nearly impunctate.

Found on a species of *Hybiscus*, and also on the candlenut tree.

Proterhinus Blackburni, n. sp. Rufescens fere concolor, setis elongatis, erectis conspicue vestitus, fortiter rugoso-punctatus, opacus; elytrorum humeris prominulis; antennis articulo 2° quam tertio crassiore et paulo longiore; femoribus minus clavatis. Long. $1\frac{3}{4}$—$2\frac{1}{4}$ mm.

First and second joints of antennæ only moderately stout; 2nd, intermediate in thickness between the 1st and 3rd, and slightly longer than the latter. Thorax a good deal narrower than the elytra, very coarsely punctured, and bearing erect setæ, which render its outline and surface indistinct. Elytra rugose, with fine erect acute setæ. Legs of an uniform red colour.

This species is readily distinguished from *P. vestitus* by the different basal joints of the antennæ, as well as by the slighter characters of colour, sculpture and clothing. I have much pleasure in complimenting Mr. Blackburn, by giving this species his name.

Proterhinus simplex, n. sp. Minus robustus, rufescens, antrorsum obscuriore, antennis nigris basi rufo; prothorace lateribus curvatis, antrorsum haud vel vix constricto,

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dense punctato, sparsim aureo-squamuloso; elytris thorace vix latioribus, fusco-rufoque subvariegatis, crebre profundeque punctatis, irregulariter aureo-squamulosis, breviterque setosis; humeris acutis sed minus prominulis. Long. 2 mm. Lat. ¾ mm.

I have seen only two immature individuals of this species, which were considered by Mr. Blackburn to be male and female, but they appear to me to be both females, the head being in both individuals without a beak. The species is at any rate distinct from any of the others here described, even if the sexual distinctions of the head prove to be the same as in the other species. The antennæ are elongate and black, but with the basal joints reddish; the 1st joint is rather stout, the 2nd moderately stout, and hardly so long as the 3rd; the 9th is distinctly larger than the 8th. The thorax is about as broad as the elytra, the sides much curved and a good deal narrowed towards the front, but without distinct constriction; the surface is densely and coarsely punctured, only indistinctly impressed towards the front, and with only very short depressed scales. The elytra are coarsely and distinctly punctured, clothed in an irregular manner with golden scales, and with very short erect white setæ. The legs are uniform red: the femora not very thick.

Proterhinus obscurus, n. sp. Minus robustus, fusco-rufus, antennis obscuris, indistincte punctatus, griseo-vestitus, brevissime setulosus; prothorace æquali lateribus valde curvatis, haud sinuatis; elytris thorace vix latioribus, humeris nullo modo prominulis. Long. 2 mm.

Antennæ moderately long, obscure or blackish-red in colour, 3rd joint distinctly longer than 2nd. Thorax very dull, very densely and indistinctly punctured, greatly rounded at the sides, clothed rather sparingly with very short depressed pale scales. Elytra rather slender and with the humeral angles quite indistinct; they are coarsely and deeply but not distinctly punctured, clothed with pale scales, and with very short white setæ: the legs are reddish, with the femora somewhat obscure. I have seen only one individual which is a male, and is distinguished from the *P. simplex* by its more sordid colour and clothing, and the less distinct humeral angles of the elytra.

Proterhinus oscillans, n. sp. Minus elongatus et

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parallelus, rufus, antennarum clava obscuriore, irregulariter pallido-squamosus, breviter setulosus; prothorace medio dilatato, dense indistincteque punctato; elytris minus elongatis, thorace latioribus, fortiter punctatis, humeris nullo modo prominulis. Long. $1\frac{7}{8}$ mm.

The antennæ are moderately long, the 1st and 2nd joints moderately stout, the 3rd longer than the 2nd. The thorax has the surface nearly even, indistinctly punctured, and with very short depressed whitish-yellow scales; it is much narrowed both in front and behind. The elytra are not elongate; they are slightly rounded at the sides and narrowed towards the shoulders, which are not in the least acute or prominent; they are of a reddish colour, indefinitely marked with darker, and are coarsely though not distinctly punctured, and bear pale scales or depressed setæ, and short erect white setæ. The legs are concolorous red, and are rather thick and conspicuously setose.

The one individual I have seen is a male. The species differs from *Proterhinus obscurus* by some differences of colour, clothing and form; its less elongate elytra, and the less evenly-curved sides of the thorax, render it probable that it is a distinct species.

Proterhinus debilis, n. sp. Angustulus, nigro-rufescens, minus læte variegatus, antennis nigris, apice obsolete clavatis; corpore setis depressis et erectis irregulariter vestito. Long. $1\frac{3}{4}$—$1\frac{7}{8}$ mm.

This is a small narrow species of dark colour, and distinguished from the allies here described by the structure of the antennæ, which are less elongate; they have the 1st and 2nd joints thick, the 2nd being quite like a bead, about as long as broad, the 3rd is rather more elongate than the 2nd, the 9th is scarcely different from the 8th, the 10th and the 11th are a little thicker; the thorax and elytra do not differ in any very conspicuous manner from the same parts in *P. obscurus*. I have seen one male and one female of this species.

Some of the species I have above attempted to describe I have not found very easy to distinguish from one another by characters easily conveyed by a description. *P. vestitus* is the largest species, with the most variegated colours, and is readily to be identified by the more uneven surface of the thorax, and by its peculiar abrupt con-

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striction at the front part. *P. Blackburni* is readily distinguishable by the very long and conspicuous slender setæ, by its more coarsely-sculptured surface, which is nearly free from scales, and by its feebler tarsi. It is the species which departs least widely from *Aglycyderes*. *P. debilis* is quite distinct by the last three joints of the antennæ being less developed than in the other species. The remaining three species are not so easy to distinguish by strongly-marked characters; though I have seen only one or two individuals of each, I expect that *P. oscillans* will be distinguished by its shorter elytra, the humeral angles of which are not in the least acute or well marked. *P. obscurus* and *P. simplex* are much more similar, but the latter seems to have the apical joints of the antennæ more developed. As, however, I have only seen the female of the one and the male of the other of these two species, their more certain distinction must be left for future observation.

I now come to the more important question of the structural characters of these little insects; these prove to be very remarkable, and have necessitated the creation of a new collective name for the species. They are, briefly, as follows:—

Antennæ 11-jointed, not geniculate, the 1st and 2nd joints thicker than the following ones, the 10th and 11th elongate, and separate, slightly broader than the preceding ones. Head narrow, in the female slightly prolonged in front, in the male furnished with a shining beak, which is about as long as the head, and considerably narrower than it, without gular sutures; antennæ inserted at the sides, close to the eyes, in an ill-defined groove. Eyes small, but very prominent, coarsely facetted; parts of the mouth minute, and not visible externally, being concealed beneath by a horny plate, which fills up the little cavity at the apex of the beak. Anterior coxæ minute, globose, entirely embedded in the thorax at a distance from the hind margin, and widely separated from one another; prothorax without visible sutures, except that there are traces of a transverse one between the front coxæ. Middle coxæ minute, globose and deeply embedded, widely separated; sutures between the pieces of the mesothorax and metathorax not visible. Metasternum very short; hind coxæ small, oval, deeply embedded, very widely separated. Hind body with five ventral segments, the 1st elongate, 2nd, 3rd and 4th subequal, rather short, separated by deep

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sutures, 5th about twice as long as the 4th. Elytra soldered together, without epipleuræ, and without fold on their inner face. Dorsal segments of hind body, except the last one, formed of excessively fine membrane, so that their number is difficult to distinguish; the apical one placed under elytra, obliquely perpendicular in position, without groove or mark at the base. Legs robust, moderately long; tibiæ without apical spurs; tarsi 3-jointed, the basal joint very short, the 2nd joint very large, consisting of two broad lobes which are very pubescent beneath; the 3rd joint stout, moderately long, terminated by two separate, rather stout, simple claws.

These characters show a relationship with *Aglycyderes* of Westwood and Wollaston, one of the most anomalous of the *Coleoptera*. The chief points in which the insects I am at present considering depart from *Aglycyderes* are, the narrow head, which in one sex is produced in front so as to form a distinct beak, and the large development of the lobes of the second tarsal joint. The tarsi in *Aglycyderes* are said to be 4-jointed, but the joint intervening between the 2nd and 4th is so minute, that it should not be counted unless the *Tetramera* are considered to have 5-jointed tarsi.

I recently described a species of *Aglycyderes* from New Zealand (Ann. & Mag. Nat. Hist., July, 1876, p. 28), and made some remarks on its position amongst the *Coleoptera*, suggesting that it might be placed as an aberrant member of the family *Colydiidæ;* since then, however, I have made some fresh investigations in connection with the peculiarities of the insects I am here treating of, and have felt compelled to change my opinion and adopt pretty nearly that of Mr. Wollaston, viz., that a separate family must be formed for *Aglycyderes*, and I have no doubt that *Proterhinus* may be correctly placed with it. The position of the family, however, is a point of still greater difficulty. Mr. Wollaston suggested an approximation to *Anthribidæ*, but *Proterhinus* tends rather to diminish than increase this affinity.

If Dr. Leconte's definition of the *Rhyncophora* as a series, distinguished from all other *Coleoptera* by the coalescence of "the posterior lateral portions of the head and prothorax on the median line of the under surface of the body so as to unite by a single suture" be accepted, there can, I think, be little doubt that the *Aglycyderidæ* must enter that series. But in that case it must be con-

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sidered an entirely isolated group, and should be placed at the commencement of the *Rhyncophora*, being widely distinguished from Leconte's series *Haplogastra* by the minute, embedded and globose front coxæ, by the more rudimentary trophi, and by the subtetramerous tarsi. Though the two species of *Aglycyderes* would not, from their facies at first sight, suggest a proximity with *Rhinomacerida* as a natural position for the family, this difficulty is removed by an inspection of the male of *Proterhinus*, which has, perhaps, more the appearance of a *Rhinomacer* than of any other insect.

Dryophthorus squalidus, n. sp. Piceus, vel fusco-niger, opacus; prothorace subconico, antrorsum leviter constricto, æquali, dense fortiterque punctato; elytris sat elongatis, subparallelis, thorace paululum latioribus, sat profunde striatis vel sulcatis, striis fortiter punctatis, interstitiis æqualibus, planis, haud velutinis, 6° ad apicem sat carinato-elevato; metasterno elongato. Long. 3½—4¼ mm. (exc. rost.)

In the male the rostrum is punctured and opaque till just before the apex, where there is left a transverse smooth space; in the female the rostrum is longer, and all the portion of it in front of the insertion of the antennæ is smooth.

The species is a good deal larger than the European *Dryophthorus lymexylon*, and the thorax is broader, with a much less distinct constriction in front: the sculpture is very similar, except that the interstices are broader in *D. squalidus*.

Mr. Blackburn says this is the commonest species in Oahu, and occurs at a lower elevation than most of the others.

Dryophthorus gravidus, n. sp. Robustus, niger, vel piceus, opacus; prothorace antrorsum angustato, lateribus rotundatis, antrorsum leviter constricto, dense grosseque punctato, æquali; coleopteris latis, haud elongatis, prothorace evidenter latioribus, grosse seriato-punctatis, interstitiis ad basin nullo modo elevatis, ad apicem declivam evidenter (præsertim secundo) carinatis, 6° versus apicem carinato-elevato; metasterno haud elongato. Long. 5—5½ mm.

I have seen four specimens of this species; its very

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robust build, and large size, and the rows of very coarse punctures on the elytra, the interstices of which, on the basal portion, are not in the least elevated, will readily distinguish it. The sexual differences are much the same as in *Dryophthorus squalidus*.

Dryophthorus crassus, n. sp. Robustus, piceus, opacus; prothorace antrorsum angustato, lateribus rotundatis, antrorsum sat constricto, fortiter punctato, æquali; coleopteris latis, haud elongatis, prothorace latioribus, minus profunde sulcatis, sulcis fortiter crenato-punctatis, interstitiis paululum elevatis, lutosis, latis, 6° versus apicem acute carinato-elevato; metasterno haud elongato. Long. $4\frac{1}{2}$—$5\frac{1}{2}$ mm.

This species, on account of its large size and heavy form, resembles *Dryophthorus gravidus*, but the difference in the sculpture of the elytra renders the two species quite easy to distinguish. I have seen a single pair, the sexual distinctions being the same as in the preceding species.

Dryophthorus declivis, n. sp. Piceus, opacus; prothorace antrorsum fortiter constricto, lateribus minus rotundatis, dense fortiter punctato, inæquali; coleopteris haud latis, sed prothorace evidenter latioribus, versus apicem planato-declivis, fortiter seriato-punctatis, interstitiis 2°, 4°, 6°que elevatis, 6° versus apicem alte carinato; rostro ad apicem fortius bidentato. Long. $3\frac{7}{8}$ mm.

Rare; I have seen only two males; they have the rostrum very rugose except just at the tip. The form of the apical portion of the elytra reminds one somewhat of the *Tomicides;* both the fourth and sixth interstices coalesce, to form the acutely-raised apical margin.

Dryophthorus modestus, n. sp. Subgracilis, nigricans, opacus; prothorace subcylindrico, antrorsum evidenter constricto, dense fortiterque punctato, disco vix inæquali; elytris haud elongatis, prothorace paululum latioribus, evidenter sulcatis, sulcis sat fortiter crenato-punctatis, interstitiis latis, æqualibus, minus elevatis; margine apicali sat elevato, cum interstitio quarto conjuncto. Long. 3 mm.

This species is just about the size of *Dryophthorus lymexylon;* the thorax is broader in comparison with the elytra, and the interstices of the elytra are broader than

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in the European species. I have seen only males of this species; according to Mr. Blackburn it is rare, and has been found by him in the stems of a species of fern in Oahu.

Note.—The sculpture of the species is very much that of *D. squalidus;* but independently of its much smaller size the present is readily distinguished therefrom by the fact that the apical side margin of the elytra is connected with the fourth interstice instead of the sixth.

Dryophthorus pusillus, n. sp. Subgracilis, nigro-ferrugineus, opacus; prothorace subcylindrico, antrorsum evidenter constricto, dense fortiterque punctato, disco vix inæquali; elytris haud elongatis, prothorace paululum latioribus, sat profunde sulcatis, sulcis minus conspicue crenato-punctatis, interstitiis vix latis, subæqualibus; margine apicali fortiter elevato, cum interstitio quarto conjuncto. Long. 2½ mm.

This is the smallest *Dryophthorus* Mr. Blackburn has yet brought to light; he informs me it is found in the mountains of Oahu and is not common. I have seen only two males. It has the eyes more reduced than is the case with the other species here described; and may also be readily distinguished from *D. modestus* by the more acutely-elevated apical margin of the elytra.

Dryophthorus insignis, n. sp. Fuscus, opacus, grosse punctatus; rostro brevissime setuloso; prothorace antrorsum profunde constricto, post constrictionem subquadrato; fortiter ruguloso-punctato, breviterque (ad marginem anteriorem dense) setuloso; coleopteris brevibus, latis, prothorace evidenter latioribus, fortiter seriatim punctatis, interstitiis 2°, 4°, 6° valde carinato-elevatis et dense setulosis, 2°, 4°, que pone basin fere interruptis, cæteris omnino inconspicuis. Long. 3 mm.

This species is found in rotten wood at a considerable elevation; it is so readily distinguished from the others by its acutely-elevated alternate interstices of the elytra, and by the almost total disappearance of the other interstices, that it is not necessary here to allude more fully to its other characters. I have received eight specimens from Mr. Blackburn; in all of them the rostrum is rugose and opaque till very near the tip; in some of them the rostrum is a little more slender than in others; whether

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these latter individuals are females, or whether I have only males before me, I am unable to state with certainty.

Pentarthrum prolixum, n. sp. Perelongatum, depressum, ferrugineum, nitidum; capite elongato anterius angustato, oculis a collo remotis; prothorace antrorsum fortiter angustato, post marginem anteriorem leviter constricto, lateribus mox ante angulos posteriores rotundatis, sat fortiter et crebre punctato, dorso plano vel obsolete impresso; elytris elongatis, parallelis, vix striatis sed regulariter seriatim punctatis. Long. exc. rost. 4—5 mm. lat. vix 1 mm.

Mas., rostro breviore et crassiore, capite paulo longiore, antennis paulo ante medium insertis; segmento ultimo ventrali latius impresso.

Fem., rostro tenuiore capite duplo, longiore, antennis longe ante medium insertis; segmento ultimo ventrali fere plano.

The very elongate and depressed form of this *Pentarthrum*, and the form of the head and rostrum, ally it to a group of species found in New Zealand, viz., *P. Wollastonianum* and *P. debile;* the rostrum has a slight constriction between the eyes and the insertion of the antennæ, and is a little dilated towards the apex; the series of punctures form very regular, somewhat depressed rows, but can hardly be correctly said to be placed in striæ: these striæ (if they may be so called) are not deeper at the apex than elsewhere.

I have seen one male and two females of this species; they were found in the stems of ferns. Mr. Blackburn informs me that the female is not rare, but that he has only found two individuals of the male, and that these were not accompanied by any females; he was thus led to suppose that what I have considered the sexes were distinct species, but I do not think such is the case.

Pentarthrum obscurum, n. sp. Angustulum, minus depressum, piceum vel ferrugineum, nitidum, fortiter punctatum; prothorace crebre fortiterque punctato, antrorsum fortiter angustato, pone apicem leviter constricto, dorso haud depresso; elytris profundius striatis, striis fortiter punctatis, versus apicem haud deletis. Long. $2\frac{7}{8}$ mm.

The antennæ in this species are small, with the 2nd

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joint of the funiculus not longer than the following ones; the eyes are contiguous with the neck; the punctures of the elytra are very distinct and regular, the interstices being narrow and without rugulosities; the 3rd joint of the tarsi is rather small and its lobes but little developed. I have seen three individuals which, I expect, are all of the male sex; they have the rostrum minutely punctate, almost simply cylindrical, moderately stout, rather more than half as long as the thorax, and the antennæ inserted just before the middle.

Pentarthrum Blackburni, n. sp. Angustulum haud depressum, subcylindricum, minus elongatum, rufo-piceum, nitidum, fortiter punctatum; prothorace conico-cylindrico, pone marginem anteriorem levissime constricto, crebre fortiter, profundeque punctato; elytris fere brevibus, vix striatis, sed seriatim sat fortiter punctatis; interstitiis sparsim transverse rugulosis. Long. $2\frac{3}{4}$ mm.

This species is shorter than *P. obscurum*, and has the elytra differently sculptured; and the 3rd joint of the tarsi is still smaller, being only slightly different from the 2nd. The only individual I have seen I suspect to be a male; it has the rostrum much as in *P. obscurum*, but not quite so finely punctured.

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IV. *Descriptions of some Exotic Lamellicorn Beetles.*

By J. O. Westwood, M.A., F.L.S., &c.

[Read November 7th, 1877.]

(Plates I. and II.)

Family CETONIIDÆ.

Subfamily Trichiides.

Genus Calometopus, Blanchard.

Catal. de la Coll. Entomologique d. Mus. d'hist. nat. Paris, t. i. 1850, p. 43; Lacordaire, Hist. n. Col. iii. p. 566.

Calometopus Nyassæ. (Pl. I. fig. 1.)

Fem.—Niger punctatus, capitis clypeo profunde inciso, pronoto transverse-ovali, nigro, macula utrinque parva luteo-setosa ad angulos anticos, alterisque duabus majoribus angulos posticos occupantibus; elytris nigris, disco irregulariter glauco, nigro parce punctato, maculis duabus fulvis ovalibus prope scutellum nigro lineatis; maculisque duabus glaucis prope apicem; lateribus elytrorum suturaque acute carinatis; segmentis detectis abdominis lateraliter albo maculatis, propygidio lineis duabus transversis albis; pygidio obscure rufo, opaco, macula cuneata apicali albo-setosa; pedibus nigris; tibiis posticis apice digitatis: corpore infra nigro, nitido; lateribus metasterni et abdominis parum vermiculatis; setisque griseis parum vestitis, segmentis 2 et 3 ventralibus utrinque transversim griseo subfasciatis.

(Marem non vidi.)

Long. corp. lin. 7½.

Habitat Nyassa, Africæ interioris. In Mus. Britann. et Higgins.

Note.—The mandibles are entire at the tip, having a short setose transverse tooth or spine near the base of the inner margin (fig. 1*a*). The maxillæ are unarmed on the inner margin, but are furnished with a long densely hairy simple terminal lobe. The maxillary palpi were wanting in the specimen examined (fig. 1*b*). The men-

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tum is deeply notched in front, with the lateral lobes rounded; it is very hairy, and the labial palpi (of which the apical joint alone is visible from the outside) are slender (fig. 1*c*). The curious digitation of the posterior tibiæ (whence the name of the genus) appears, from the corrected description given by M. Lacordaire, to be confined to the female sex. The genus is well characterized by the small flat glabrous elytra, having the suture and the lateral margins elevated into strong carinæ. The following is the description given by Mr. Blanchard of the type species of the genus:—

Calometopus senegalensis, Blanch. l. c.

Niger, capite medio rufo, prothorace omnino rufo seu obscuro; scuto (scutello) rufo nigro-limbato; elytris fulvis, margine externo nigro; sutura carinaque laterali elevatis, pygidio nigro rugoso maculis fulvis binotato, abdomine nigro, maculis lateralibus albis; pedibus fulvis, tarsis tibiarumque apice nigris. Variat femina elytris fere omnino nigris.

Long. 13—15 mill.

According to M. Lacordaire the male is dull black above, shining beneath, and the female fulvous, with the forehead, the sides of the elytra beyond the middle, the breast, abdomen and tarsi black; these colours possibly being variable in both sexes. As the specimens which I have seen from Nyassa are uniform in their colours, I have not hesitated to consider them as forming a distinct species from the Senegal one.

Genus Valgus, Scriba.

Valgus furcifer, n. sp. (Pl. I. fig. 2.)

Niger punctatissimus luteo nigroque squamosus, pronoto subquadrato, antice supra caput parum rotundato-producto, angulis anticis lateralibus rotundatis, posticis extus parum acute productis; disco in medio longitudinaliter paullo canaliculato, tuberculisque duobus dorsalibus in medio instructo, margine postico curvato et ad basin scutelli rotundatim-producto: elytris latis subquadratis, lateribus deflexis, dorso subplanis; basi fulvescentibus, singulo prope scutellum nigro 4-striolato, striolis curvatis: fascia abbreviata transversa nigra pone apicem scutelli; dimidio postico elytrorum lutescenti, fascia transversa pone medium nigra, postice prope suturam extensa; plaga lutescente transverse-ovata apicali in singulo elytro relicta, maculam nigram

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includente; propygidio obscure rufo in angulum acutum extus utrinque producto, tuberculisque duobus nigro-setigeris in medio instructo, spatio triangulari luteo setoso inter tubercula notato, pygidio etiam in medio luteo-setosa apiceque in processum furcatum terminato: pedibus longis nigris; tibiis anticis extus 3-dentatis, denticulisque duobus intermediis armatis; corpore infra obscure nigro, subtiliter punctato, squamulis obscure luteis parsim, metasterni lateribus squamis fulvis densius vestitis.

Long. corp. lin. 5.

Habitat in Sumatra. In Mus. D. Higgins.

Subfamily Goliathides.

Genus Narycius, Dupont.

Sub-genus Cyphonocephalus, Westw. Arc. Ent. 1, p. 115.

Type, *C. smaragdulus*, Westw. l. c., pl. 33, fig. 2, and details. (Pl. I. fig. 3 ♂, fig. 4 ♀.)

The original description of this interesting group above referred to was founded upon an unique specimen from the East Indies, contained in the Museum of the Bristol Philosophical Institution, which, so far as I know, has remained unique up to the present time. The specimen is a male of a brilliant green colour, with the clypeus, horns of the head and tarsi brunneous, and with the femora and tibiæ more opaline. I am now indebted to J. Wood-Mason, Esq., of the Calcutta Museum, for a specimen of the male agreeing with the Bristol specimen; a second male of a rich dark purple colour, agreeing in all its characters with the type specimen, and which is represented in the accompanying figure. With these, Mr. Wood-Mason transmitted a specimen of the female represented in fig. 4, of the natural size. Like the females of almost all cornuted males, it is smaller than the other sex. It will be seen, by comparing the figures of the female now published of this species (fig. 4) with that of the female of *Narycius opalus*, given in my Arcana Entomologica, vol. 1, pl. 33, fig. 1, and p. 114, and their respective details, that they are nearly identical, not only in general form and in the armature of the head (the latter being a very unusual circumstance in female insects), but also in the details of the mouth-organs, especially the maxillæ.

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If the characters of these females alone were regarded, I should not hesitate to consider them as congeneric, but the different condition of the legs of the males of the two species indicates the necessity for their subgenerical separation. (Comp. Arc. E., pl. 33, fig. 1*b*, and my pl. I. fig. 4*c*.) The mesosternal spine is not, however, so much porrected in *C. smaragdulus* as in *N. opalus*. Like the male represented in my Arcana Ent., this female is of a rich green colour.

Subfamily Cremastocheilides.

The characters of the two following species were introduced into the Appendix of my Thesaurus Entomologicus Oxoniensis, but no figures of them have hitherto appeared. They are, therefore, now added in order to complete the knowledge of the insects, for which in fact (in this difficult group) representations are quite requisite.

Genus Cyclidius, MacLeay.

Cyclidinus velutinus, Westw. Thes. Ent. Oxon. App. p. 204. (Pl. I. fig. 5.)

Totus niger, opacus: capite parvo sub lente punctatissimo, inter antennas bi-impresso; mento et maxillis ut in Cycl. lugubre formatis: pronoto multo latiori quam longo, lateribus in medio dilatato-rotundatis, angulis posticis lateralibus acutis, dorso depresso, utrinque impressione ovali parum profunda notato; elytris basi latis, dorso planis, leviter ovali-cicatricosis; pygidio leviter rotundato-cicatricosis; pedibus subgracilibus; corporis subtus (præsertim ventre) rudius punctato, guttisque minutis lutescentibus parum irrorato.

Long. corp. lin. 9; lat. humer. elytr. lin. 4.

Habitat ——? In Mus. D. Parry.

Genus Cremastocheilus, Knoch.

Cremastocheilus crassipes, Westw. Thes. Ent. Oxon. p. 204. (Pl. I. fig. 6.)

Magnus, latus, supra deplanatus, niger, capite punctato, clypei margine antico parum recurvo, semicirculari, mento rotundato, postice integro, disco glabro; pronoto lateribus rotundatis versus caput angustioribus, dorso parum convexo, angulis anticis fere ad oculos porrectis, subacutis, impressione sat profunda intra angulos notato, angulis

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posticis in cornu breve retro productis, impressione ovali intra angulos posticos, margine postico curvato, disco punctato punctis præsertim lateralibus majoribus et rotundo-cicatricosis, breviter setoso: elytris latis, dorso planis, punctis ovalibus postice incompletis parum profundis, guttis minutis strigisque brevibus tenuissimis interdum undulatis prope suturam, albis, parce notatis; pedibus brevibus latis crassis, fossoriis, tibiis anticis dentibus valde obtusis, tarsis tibiis multo brevioribus, articulis latioribus quam longis.

Long. corp. lin. 8½; lat. humer. elytr. lin. 3½.

Habitat in California. In Mus. Parry.

This very distinct species belongs to the group with the mentum entire in the middle of its hind margin, and which have the anterior tarsi with the terminal joints not suddenly dilated, but differs from the two species hitherto described, having the legs short and fossorial (*C. Schaumii and angularis*), by having the legs comparatively much broader and shorter, with the joints of the tarsi broader than long.

The following additional species of the genus *Cremastocheilus* has recently been described, and is here added to complete the bibliography of the genus:—

Cremastocheilus Wheeleri, J. Leconte, in Appendix H. 10, to Report of Chief of Engineers of the United States Geographical Survey, west of the 100th meridian. Washington, 1876.

Brownish-black, not shining; head feebly punctured, much dilated in front, broadly truncate, side angles rounded. Prothorax subquadrate, a little wider behind, sinuate on the sides; front angles acute, incurved and densely hairy on the inner side; hind angles rounded, expanded posteriorly; middle third of disk depressed, covered with large shallow punctures; lateral thirds separated by a shallow impression more distinct near the base and tip, very sparsely punctured, rather shining and quite smooth behind the middle. Elytra with large shallow elongate punctures as usual; humeri shining; mesothoracic epimera not visible from above in consequence of the posterior expansion of the hind angles of the prothorax. Tibiæ compressed; front pair with two approximate teeth; middle pair with two distant teeth besides the apical one;

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hind pair with a small acute denticle about the middle. Tarsi compressed, hind pair two-thirds as long as the tibiæ. Beneath feebly punctured, pubescent with brown hair; mentum deeply concave, subtriangular, bisinuate behind, with the side angles produced and rounded; hind margin feebly notched at the middle.

Length, 10·6 mm. = 0·42 inch.

Northern New Mexico; Lieut. W. L. Carpenter.

In the division of the disk of the prothorax into three parts, this species seems to be related to *C. saucius*. The dividing groove is, however, not well defined, and in other respects there is no resemblance. The form of the mentum is quite peculiar, and in a group where specific differences are of less magnitude, would warrant the establishment of a separate genus.

Subfamily Dynastides.

Genus Amblyodus, n. g.

Genus novum Phileuro proximum, Leptognatho et Actinobolo affine; differt capite cornuto mandibulisque extus obtuse dentatis.

Corpus sub-breve, subparallelum subcylindricum (Sienodendron parum simulans).

Caput mediocre lateribus in cornua duo curvata, apice obtusa elevato-porrectis (pl. II. figs. 1*a*, 1*b*).

Mandibulæ porrectæ, lateribus externe dilatatis et obtuse dentatis, dextera 2, seministra 3 dentibus obtusis armatis; spatio parvo setoso marginis interni, laminaque molari basali instructæ (fig. 1*c*).

Maxillæ elongatæ extus longe setigeræ, lobo apicali ad basin in spinam curvatam apice denticulatam producto; parte apicali curvata, apice obtusa, intus inermi vel dente obtuso armata; palpis maxillaribus mediocribus articulo ultimo elongato ovali (fig. 1*d*).

Mentum corneum crateriforme, medio canaliculatum, basi carinatum punctatum setosum, apice emarginato (fig. 1*e*).

Labium internum: palpi labiales intus mentum insertæ articulo apicali tantum detecto (fig. 1*e*).

Pronotum magnum semiovale, latitudine elytris æquale, antice retusum scabrum, margine postico fere recto, utrinque lobo elevato obliquo glabro instructum.

Scutellum triangulare apice rotundato elytra brevia apice rotundata, convexa.

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Pedes mediocres, tibiæ anticæ extus 4-dentatis, tibiæ intermediæ et posticæ dentatæ.

Having in the 4th volume of the Transactions of the Entomological Society published the characters of some interesting forms of *Lamellicornia* allied to *Phileurus*, I have the gratification of adding another equally curious from Nicaragua, collected by Mr. Belt at Chontales. It appears most nearly allied to *Actinobolus* (l. c. Pl. II. fig. 2) in the structure of the maxillæ and mentum, but the front of the head in that genus (ib. fig. 2*b*) is radiated, whilst the mandibles (ib. fig. 2*d*) are armed above only with a short obtuse tooth. The males of *Leptognathus** (ib. fig. 4) have the front of the pronotum rather retuse, but the front of the head is bilobed in both sexes, and the mandibles (ib. fig. 4*a*) have the outer lobe produced to a fine point, and the inner lobe large, oval and setose, the maxillæ also (ib. fig. 4*e*) want the strong armature of the apical lobe.

Species unica, *Amblyodus taurus*, n. sp. (Pl. II. fig. 1.)

Niger, nitidus capitis cornubus glabris supra deplanatis apice extus elevato-curvatis obtusis, pronoto antice retuso, varioloso rugoso; postice glabro utrinque elevato, angulis posticis acutis punctatis, elytris punctato-striatis.

Long. corp. lin. 11.

Habitat in Nicaragua, Chontales. D. Belt.

Genus PANTODINUS, Burm.

Pantodinus Klugii, Burmeister Handb. d. Ent. v. p. 291. (Pl. II. fig. 2*a*.)

No figure of this very interesting insect having hitherto been published I have taken this opportunity of giving a representation of it, together with its trophi, from sketches made by Dr. Burmeister. The genus was founded on an unique male from Guatemala in Mr. Melly's Collection, and was placed by its author in conjunction with the genera *Leptognathus* (under the name of *Cryptodontes*)

* I do not recognize the necessity of rejecting the name *Leptognathus*, which I proposed for this genus (in order to avoid the confusion arising from the use of the name *Cryptodon*, given to it in MSS. by Latreille, with that of *Cryptodus*, given to *another Lamellicorn genus* by MacLeay), in consequence of there having been a genus of *fishes* previously named *Leptognathus* by Swainson.

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and *Xenodorus*. De Brême (Ann. Soc. Ent. France, 1844, pl. 7, fig. 8), in a terminal section of the *Xylophila* (*Dynastidæ*, M'L.), immediately preceding the *Lucanidæ*.

By M. Lacordaire it was placed with *Leptognathus* at the end of the *Dynastidæ*, immediately preceding the *Cetoniides*, with the remark, "Ces insectes sont, dans le sens rigoureux du mot, des Dynastides pourvus de mandibules de Cétonides. Leur cavité buccale a, du reste, des rapports sensibles avec celle des derniers Phileurides, notamment des Actinobolus et leur labre est situé comme celui de Xenodorus du groupe des Oryctides vrais; seulement il est encore plus petit et moins apparent." (Hist. d. Coléopt. iii. p. 462.)

Both sexes of this insect having been received by M. Candèze, he has been enabled to study it more completely, and has come to the conclusion that it ought to be placed at the head of the *Trichiides* in the family *Cetoniidæ*, a position which, we have seen, was already indicated to a certain extent by M. Lacordaire.

"Je pense," says M. Candèze, "que la veritable place de Pantodinus Klugii est dans les Cétonides, en tête de Trichides, ou avec les Inca, il représente les Goliathides. L'insecte a les hanches antérieures coniques et saillantes comme toutes les Cétonides, tandis que les Dynastides les ont franchement transversales et enfouies, ce que est pour Lacordaire et Erichson le caractère fondamental qui distingue les deux tribus; il a des mandibules en partie membraneuses, autre caractère essentiel; enfin le chaperon de la femelle que n'est pas pourvue de la corne que l'on remarque chez le mâle est un chaperon de Cétonide et nullement de Dynastide. (Candèze en Ann. Soc. Ent. Belgique XVI., p. xli.)

The illustrations of this curious insect, now published, will materially assist in the determination of the affinities of this remarkable species.

Genus NICAGUS, Leconte.

Nicagus obscurus, Leconte. (Pl. II. fig. 3.)

Ochodæus obscurus, Leconte, Journ. Acad. Philad. 1848, p. 8.

Nicagus obscurus, Leconte, Class. of Coleopt. N. Amer. 1861, p. 130; Parry, Proc. Ent. Soc. 1870, p. iii; Westwood, Proc. Ent. Soc. 1870, p. ix; H. Deyrolle, Trans. Ent. Soc. 1873, p. 344.

This remarkable insect was first described by Dr. J.

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Leconte as an *Ochodæus*,* and was subsequently placed by him as a distinct tribe between the *Acanthocerini* and *Trogini*. Subsequently, however, as we learn from Major Parry's note in the Proceedings of the Entomological Society above referred to, Dr. Leconte intimated his dissatisfaction as to the correctness of his previously-recorded views, suggesting that it might possibly be better placed among the *Lucanoidea*,† an opinion subsequently

* The following is Dr. Leconte's detailed description of this insect:—"*Nicagus obscurus* is the only member of this tribe (*Nicagini*) known to me. It is an oval convex insect, more than a quarter of an inch long, brown, densely punctured, and covered with very short pale hair. It resembles in appearance some of the *Sericæ*, or a nearly smooth *Trox*. It is found throughout the Atlantic district. The head is rounded, moderately convex, the front finely margined; the labrum is broadly rounded, hairy; the mandibles short, pyramidal, not very prominent; the mentum is thick, triangular, hairy, pointed in front; the palpi short, the last joint oval. The antennæ are 10-jointed, the club 3-jointed, longer in the male than in the female. The anterior coxæ are large, conical, prominent, the middle ones nearly contiguous, oblique; the epimera of the mesothorax attain the coxæ. The elytra cover the pygidium. The abdomen has five free ventral segments. The legs are normal in form; the anterior tibiæ are 4-toothed, the middle and hind ones gradually thickened towards the tip in the female, but slender in the male, with one small sharp tooth and some small denticles on the outer face; the spurs of the hind tibiæ are acute in the male, obtuse in the female; the tarsi are long and slender in the male, but shorter and stouter in the female; the onychium is narrow, and bears two long bristles, as in *Lucanidæ*.

"I have been very much at a loss where to place this curious insect. The joints of the club of the antennæ do not appear to be capable of being brought into absolute contact, as in other *Scarabæidæ*, and the club therefore appears pectinate. I was therefore inclined to consider it as allied to the European *Æsalus*, among the *Lucanidæ*, which genus it resembles somewhat in form; but the small size of the oral organs, and the triangular mentum, have induced me rather to place it as a tribe of the *Laparostict Scarabæidæ*, and the position here given it well corresponds both with its external form and *Melolonthine* sexual characters. Of its habits I know nothing."

† In the Proceedings of the Ent. Soc., 7th Feb. 1870, p. 111, it is recorded that "Major Parry states that, on his recent visit to this country, Dr. Leconte presented him with a specimen of this insect, intimating that he was not satisfied as to the position he had assigned to *Nicagus*, namely, among the *Scarabæoidea*, between *Acanthocerus* and *Trox*, and suggesting that it might possibly be better placed among the *Lucanoidea*. The specimen had been carefully examined by Major Parry and Mr. Charles Waterhouse, but as regarded the principal character of the antennæ of the *Lucanoidea*, the immoveability of the leaflets of the clava, it was found that in *Nicagus* the leaflets were slightly moveable; in this respect, however, Mr. Waterhouse found it to agree with some Australian species of *Ceratognathus*, and, on examining the mouth, he could not detect anything by which it could be separated from the *Lucanoidea*, whilst the penicillate maxillæ were alone sufficient to separate it from the *Trogidæ* (ibid. p. ix.). Professor Westwood said that he had examined Major Parry's specimen of *Nicagus obscurus*, and without saying to what group of *Lamellicorns* the genus was properly referable, he felt clear that it did not belong to any of the *Lucanoid* families."

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endorsed by Mr. C. Waterhouse and M. H. Deyrolle. In this diversity of opinion I have thought it would be considered of interest to publish a series of figures representing the structural details of the insect, which I have been enabled to make upon a dissection of a specimen presented by Dr. Leconte to Major Parry, amongst which will be especially considered worthy of notice the following characters not hitherto remarked upon, namely, the simple internal margin of the mandibles, destitute of a molar plate, the entire condition of the eyes, the finely crenulated lateral margin of the prothorax, the small size of the teeth of the outer edge of the fore tibiæ, except the two terminal ones, and the remarkable form of the mentum especially when seen laterally. These characters certainly bespeak an affinity with some of the small obscure Australian *Lucanidæ*, such as *Ceratognathus*; but a comparison of the details here given with those of various genera of *Trogidæ*, published in my memoir in Trans. Ent. Soc. vol. IV. pl. 11, especially those of *Apolonychus*, Westw. fig. 5, appears to prove (as it seems to me) the near relationship of *Nicagus* to those insects. In its details, also, it does not very much disagree with those of *Achloa*, given by Erichson, Entomographien, pl. 1. fig. 6. This diversity of opinion will, I think, render my series of illustrations of the characters of the genus acceptable to Coleopterists.

DESCRIPTION OF THE PLATES.

Plate I.

Fig. 1. *Calometopus nyassæ*, the female; 1*a*, mandible; 1*b*, maxilla, without the palpus; 1*c*, mentum and palpi; 1*d*, extremity of posterior tibia and base of tarsus.

Fig. 2. *Valgus furcifer* magnified; fig. 2*a*, the anterior tibia; 2*b*, *propygidium* and *pygidium* seen sideways; 2*c*, the same seen from behind.

Fig. 3. *Cyphonocephalus smaragdulus*, the dark purple variety of the male of the natural size.

Fig. 4. *Cyphonocephalus smaragdulus*, the female of the natural size; 4*a*, the head of the female magnified, seen from above; 4*b*, the same seen sideways; 4*c*, the maxillæ without the palpus; 4*d*, the mentum; 4*e*, mesosternal process.

Fig. 5. *Cyclidinus velutinus* magnified; 5*a*, the head and prosternal process seen sideways; 5*b*, mandible; 5*c*, maxilla; 5*d*, mentum

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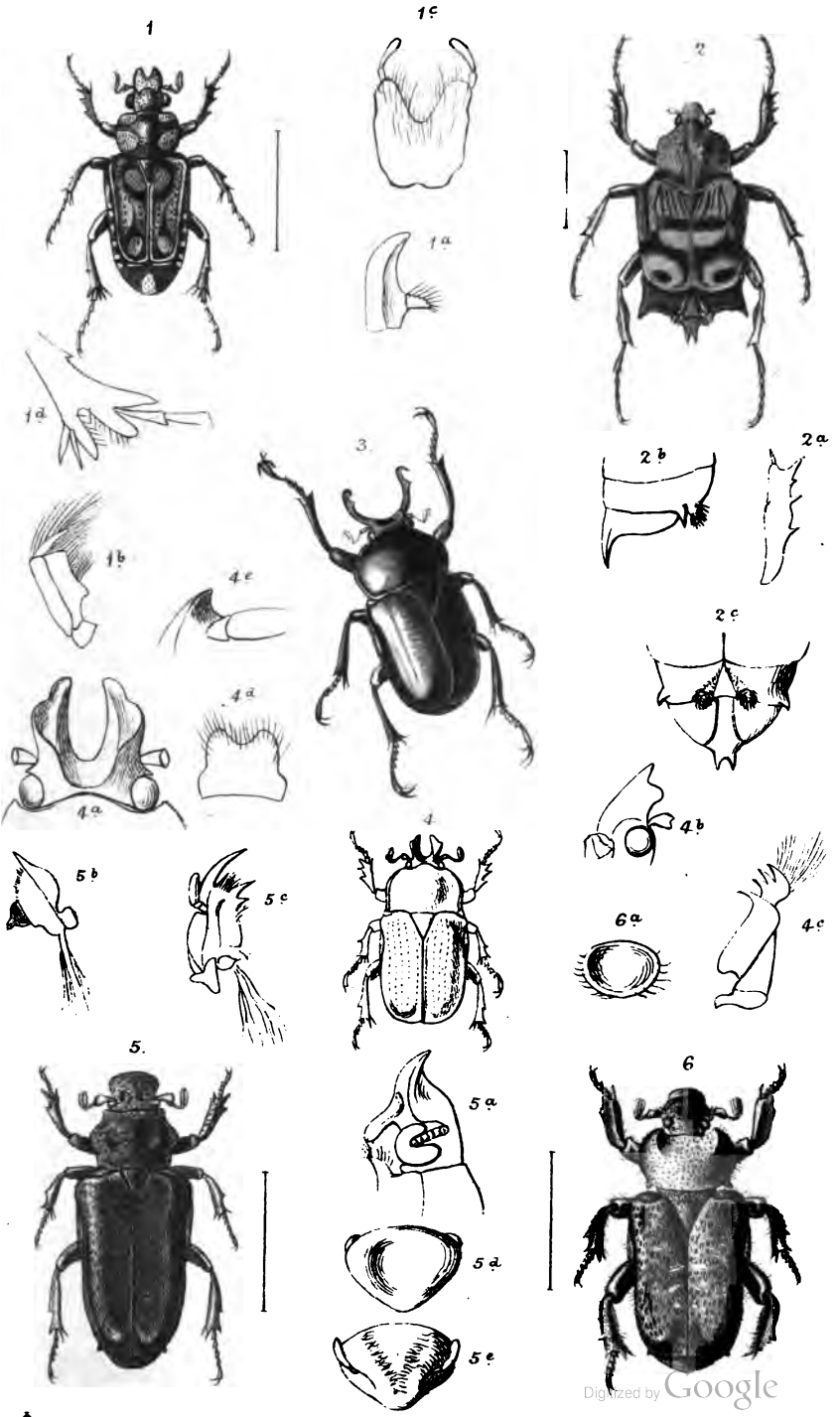

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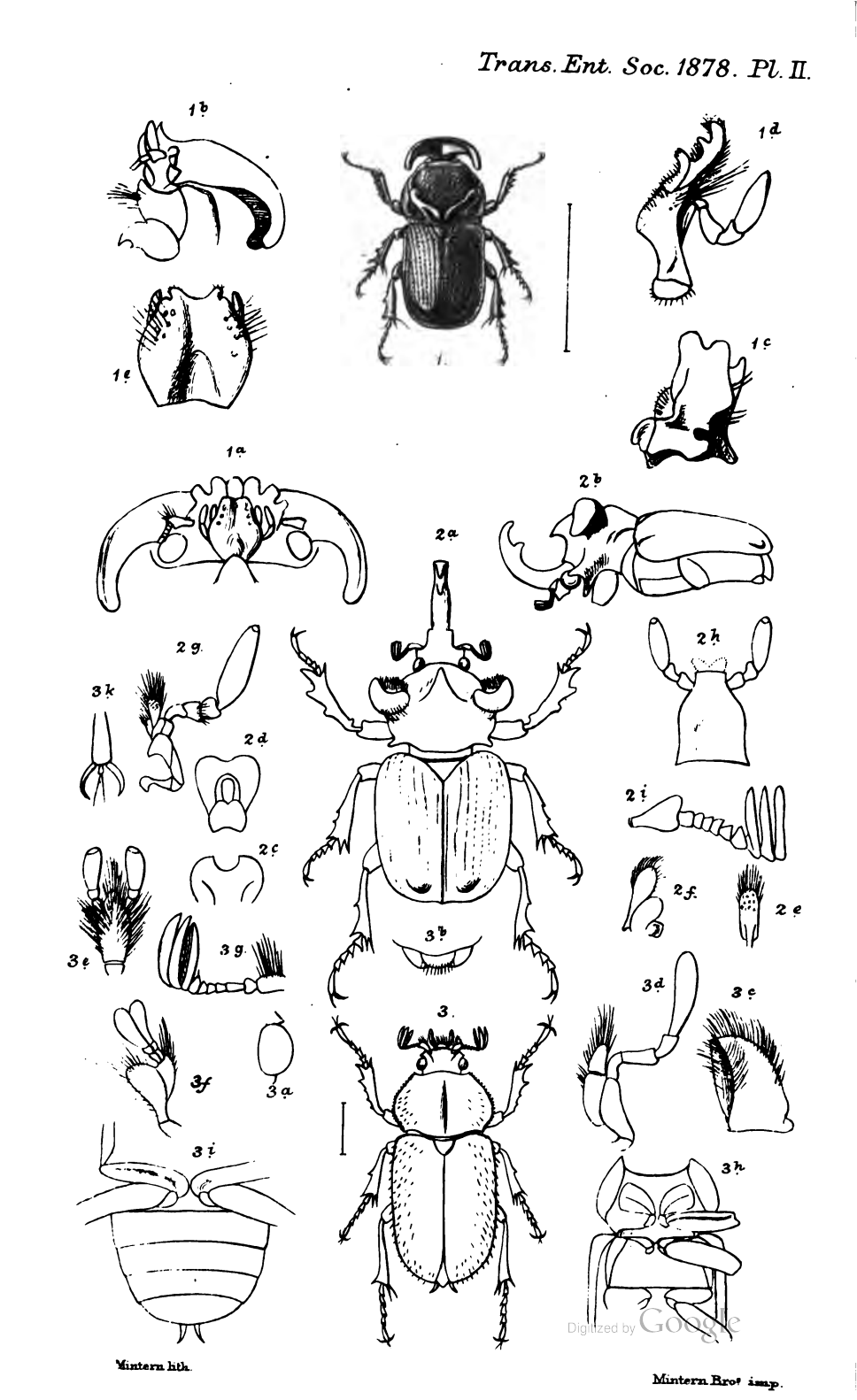

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seen from the outside; 5*e*, the same seen from within the mouth, showing the setose labium connate with the inner surface of the mentum and the labial palpi.

Fig. 6. *Cremastocheilus crassipes* magnified; 6*a*, mentum.

Plate II.

Fig. 1. *Amblyodus taurus* slightly magnified; fig. 1*a*, the head seen from below; fig. 1*b*, the head and front of the prothorax seen sideways; 1*c*, mandible; 1*d*, maxilla; 1*e*, mentum.

Fig. 2. *Pantodinus Klugii*, natural size; 2*b*, the same seen sideways without the legs; 2*c*, clypeus; 2*d*, clypeus from beneath, with the minute labrum *in situ;* 2*e*, labrum; 2*f*, mandible; 2*g*, maxilla; 2*h*, mentum, with terminal bilobed labium and labial palpi; 2*i*, antenna.

Fig. 3. *Nicagus obscurus* magnified; 3*a*, side of head and eye; 3*b*, labrum and mandibles *in situ;* 3*c*, mandible; 3*d*, maxilla; 3*e*, mentum and labial palpi from beneath; 3*f*, the same seen sideways; 3*g*, antenna; 3*h*, underside of thorax; 3*i*, underside of abdomen and base of hind legs; 3*k*, apex of tarsi with bisetose onychium.

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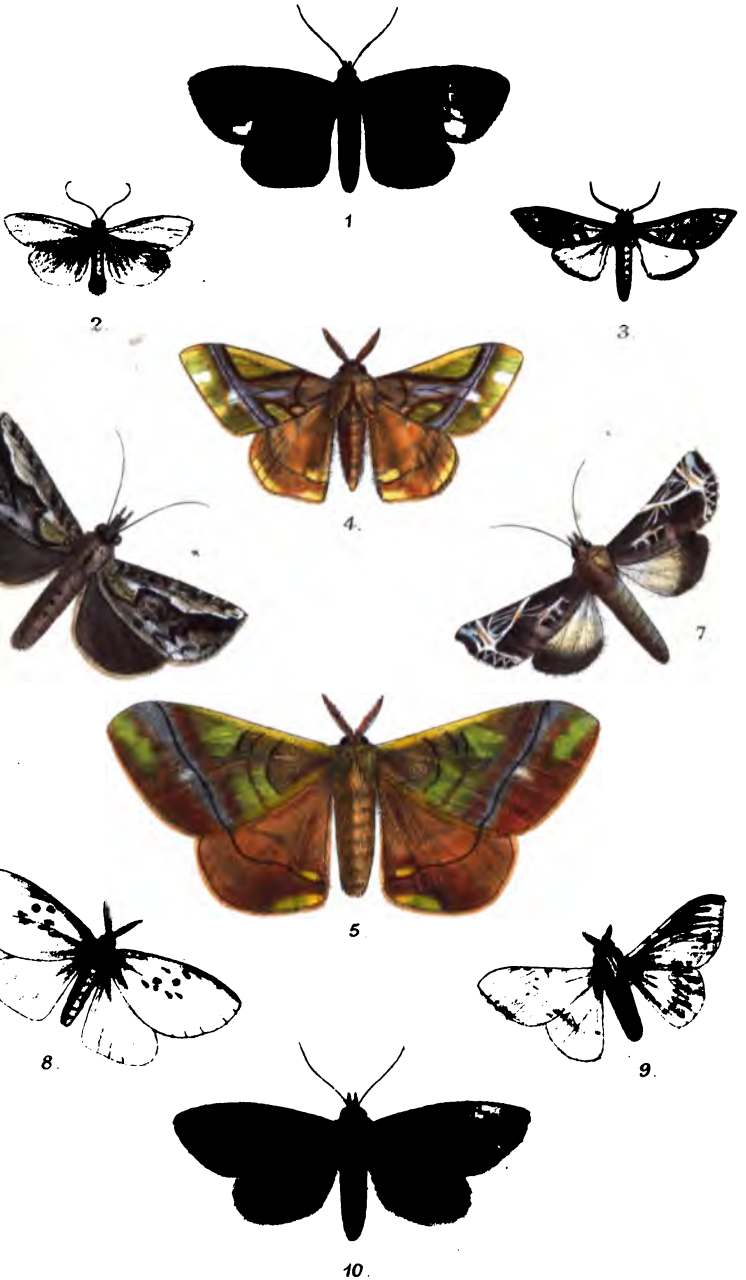

Bombycites of the Amazons.

Mintern Bros lith.

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V. *On the* Lepidoptera *of the Amazons, collected by* Dr. JAMES W. H. TRAIL, *during the years* 1873 *to* 1875. By ARTHUR GARDINER BUTLER, F.L.S., F.Z.S., &c.

[Read December 5th, 1877.]

(Pl. III.)

PART II.—SPHINGES AND BOMBYCES.

THE moths recorded in the present paper were, almost without exception, taken by Dr. Trail in the cabin of the steamer, into which they were attracted by light; and considering that in this manner no less than 166 species of *Sphinges* and *Bombyces* alone were obtained, it only shows how much may be done in this way by any collector who really gives his heart to the work.

Of the 166 species here enumerated, no less than 84 prove to be new to science, and so varied are they in structure that I have been compelled to erect 18 new genera to accommodate them; of these 23 new species, two of which were also new genera, have already been described and figured in "Illustrations of Typical Specimens of Lepidoptera Heterocera in the Collection of the British Museum. Part I.;" the remainder are described in the present communication.

HETEROCERA.

Family SPHINGIDÆ.

AMBULICINÆ, *Butler.*

AMBULYX, *Walker.*

1. Ambulyx strigilis.

Sphinx strigilis, Linnæus, Mant. Ins. i. p. 538; Drury, Ill. Exot. Ent. i. p. 62; pl. 28, fig. 4 (1770).

Pará, 9th March, 1875.

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CHÆROCAMPINÆ, *Grote.*

PACHYLIA, *Walker.*

2. Pachylia ficus.

Sphinx ficus, Linnæus, Mus. Lud. Ulr. p. 353 Clerck's Icones, pl. 49, fig. 2 (1759).

Taken at light near Cadajaz, Rio Solimões, 20th December, 1874.

SPHINGINÆ, *Grote.*

PROTOPARCE, *Burmeister.*

3. Protoparce carolina.

Sphinx carolina, Linnæus, Mus. Lud. Ulr. p. 346; Drury, Ill. Exot. Ent. i. p. 52; pl. 25, fig. 1 (1770).

Tunantins, 26th January, 1874.

This example, and others which we have from Southern America, are considerably darker than the northern specimens.

Mr. Trail says that his specimen was taken soon after emergence from the pupa.

PHRYXUS, *Hübner.*

4. Phryxus caicus.

Sphinx caicus, Cramer, Pap. Exot. ii. p. 42; pl. 125, fig. F. (1779).

At rest on a rock at Obydos, 5th February, 1874.

One male in fine condition.

Family CASTNIIDÆ.

CASTNIA, *Fabricius.*

5. Castnia mimica.

Castnia mimica, Felder, Reise der Nov. Lep. iv. pl. 79, fig. 4 (1874).

Coary, Rio Solimões, 16th October, 1874.

One example of this rare species in good condition.

Family ZYGÆNIDÆ.

EUCHROMIINÆ, *Butler.*

HISTICÆA, *Walker.*

6. Histicæa amazonica.

Histicæa amazonica, Butler, Journ. Linn. Soc. 1876, p. 362, n. 5.

Forest at Retencëio, Rio Purus, 8th October; Lago

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cerrado, Rio Juruá, in the forest, 30th October; Tabatinga, 30th November, 1874.

MASTIGOCERA, *Boisduval.*

7. Mastigocera pusilla.
Mastigocera pusilla, Butler, Journ. Linn. Soc. 1876, p. 372, n. 2.
Tabatinga, 29th November; Rio Javary, 3rd December, 1874.

LÆMOCHARIS, *Herr.-Sch.*

8. Læmocharis fenestrina.
Læmocharis fenestrina, Butler, Journ. Linn. Soc. 1876, p. 383.
Off Ilha Jacitára, Rio Solimões, 12th January, 1875.

PSEUDOMYA, *Hübner.*

9. Pseudomya tenuis.
Pseudomya tenuis, Butler, Ill. Typ. Lep. Het. i. pl. 17, fig. 1.
Rapid of Porteira, Rio Trombetas, 2nd March, 1874.

COSMOSOMA, *Hübner.*

10. Cosmosoma tyrrhene.
Euchromia tyrrhene, Hübner, Samml. Exot. Schm. Zutr. figs. 483, 484.
Marsh at Prainha, 17th December, 1873.

DYCLADIA, *Felder.*

11. Dycladia lacteata.
Dycladia lacteata, Butler, Ill. Typ. Lep. Het. i. pl. 17, fig. 3.
Rio Jutahi, 5th February, 1875.

12. Dycladia varipes.
Glaucopis (*Phacusa*) *varipes*, Walker, Lep. Het. i. p. 175.
Manaos, 12th June, 1874.

13. Dycladia tenthredoides.
Ilipa tenthredoides, Walker, Lep. Het. vii. p. 1610.
Rio Juruá, 7th November, 1874.

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14. Dycladia militaris.
Dycladia militaris, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 1.
Silves, 19th April, 1874.

MARISSA, *Walker*.

15. Marissa eone.
Agerocha eone, Hübner, Samml. Exot. Schm. Zutr. figs. 417, 418.
Serpa, 13th February, 1875.

HYDA, *Walker*.

16. Hyda xanthorhina.
Eurata xanthorhina, Herrich-Schäffer, Auss. Schm. fig. 226.
Prainha, 1st December, 1873.
One damaged example taken by sweeping.

HYELA, *Walker*.

17. Hyela astrifera.
Hyela astrifera, Butler, Ill. Typ. Lep. Het. i. pl. 17, fig. 2.
Braga, Rio Javary, 7th December, 1874.

EUNOMIINÆ, *Butler*.

COREMATURA, *Butler*.

18. Corematura chrysogastra.
Glaucopis chrysogastra, Perty, Delect. pl. 31, fig. 10.
Rio Madeira, 17th May, 1874.

SCHASIURA, *Butler*.

19. Schasiura mimica.
Schasiura mimica, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 6.
Barreiras das Araras, Rio Solimões, 16th January, 1874.
Taken by sweeping amongst maize.

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TRICHURA, *Hübner.*

20. Trichura aurifera.

Trichura aurifera, Butler, Journ. Linn. Soc. 1876, p. 405.

Lower Amazons.

No date or locality distinguishable on the envelope.

ECDEMUS, *Herr.-Sch.*

21. Ecdemus hypoleucus?

Ecdemus hypoleucus, Herrich-Schäffer, Auss. Schm. fig. 420.

Rio Jutahi, 26th January, 1875.

The single example obtained differs from Herrich-Schäffer's figure in its clay-brown colouration; it may be distinct.

ANTICHLORINÆ, *Butler.*

PSEUDACLYTIA, *Butler.*

22. Pseudaclytia opponens.

Pampa opponens, Walker, Lep. Het. Suppl. i. p. 100.

Mauhes River, 2nd May; west bank of Rio Negro, 16th June; Rio Negro, 4th July; Rio Juruá, 24th October; Tunantins, 23rd November, 1874; Carvoreiro, Rio Negro, 18th January, 1875.

CERAMIDIA, *Butler.*

23. Ceramidia obscura.

Ceramidia obscura, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 5.

Forest near Sobral, Rio Purus, 17th September, 1874.

Family ARCTIIDÆ.

CHARIDEINÆ, *Butler.*

ACLYTIA, *Hübner.*

24. Aclytia halys.

Sphinx halys, Cramer, Pap. Exot. iv. pl. 357, fig. C.

Pupunha, Rio Juruá, 5th November, 1874; Boa Vista, Rio Jutahi, 1st and 5th February, 1875.

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HELIURA, *Butler*.

25. Heliura gnoma.

Heliura gnoma, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 2.

Rio Padaniry, under the Equator, 26th June, 1874.

26. Heliura lamia.

Heliura lamia, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 3.

Rio Mauhes, 5° 30′ S., 29th April; Tanaria, Rio Purus, 1st October, 1874.

METRIOPHYLE, *Butler*.

27. Metriophyle lacteinota.

Heliura lacteinota, Butler, Journ. Linn. Soc. 1876, p. 417.

Rio Purus, near Aruman, 8th September; Jurucua, Rio Purus, 24th September; Rio Juruá, 23rd October; Curimata, 30th October; Rio Juruá, 7th November; Gaviao, 10th November; Rio Juruá, 13th November, 1874.

This species much resembles *Heliura leneus*, but has the sexes alike as in *M. apicalis*.

ACRIDOPSIS, *Butler*.

28. Acridopsis marica.

Sphinx marica, Cramer, Pap. Exot. i. pl. 20, figs. F, G.

Gepatiny, Rio Purus, 29th September, 1874.

29. Acridopsis pusilla, n. sp.

Allied to the preceding, but much smaller and paler; the primaries tinted with pink at the base, the black spots smaller, the veins whitish; no tint of green in any of the wings; secondaries with a broader blackish outer border occupying nearly half the wing; tegulæ indistinctly whitish at the edges; hind margin of head carmine; abdomen brown with a large rosy ventral patch; wings below very similar to *A. marica*, but the secondaries with broader outer border: expanse 1 inch 1 line.

Braga, Rio Javary, 7th December, 1874.

The primaries above much resemble those of *Heliura solicauda*, Butler, Ill. Lep. Het. i. pl. 9, fig. 4.

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30. Acridopsis lucis, n. sp.

Intermediate in size between the two preceding, primaries as in *Heliura solicauda*, secondaries dull black with a bifid hyaline white spot near the base; the veins, basal area and costa of primaries and the borders of the thorax sandy yellow; hind margin of head carmine; abdomen brown, greyish below; centre of pectus whitish, coxæ rosy: expanse 1 inch 3 lines.

Rio Jutahi, 5th February, 1875.

This insect has somewhat the aspect of *Sphinx pierus* of Cramer's plate 367.

TELIONEURA, *Felder.*

31. Telioneura brevipennis.

Telioneura brevipennis, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 9.

Guajaratuba, Rio Purus, 11th September, 1874.

32. Telioneura glaucopis.

Telioneura glaucopis, Felder, Reise der Nov. Lep. iv. pl. 102, fig. 31. Rio Negro, 18th June; Rio Purus, near Aruman, 8th September; Jurucua, 24th September; Mamiva, 28th September; Uricuri, 2nd October; Curimatá, Rio Juruá, 30th October and 14th November, 1874.

AUTOMOLIS, *Hübner.*

33. Automolis zenzeroides.

Automolis zenzeroides, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 8.

Near Porto Salvo, Rio Juruá, 3rd October, 1874.

PIONIA, *Walker.*

34. Pionia notata, n. sp.

Primaries above black with steel-blue reflections; base of costal border ochreous; an abbreviated white band (ochreous on costa) across the end of the cell, and below it a small round sordid whitish spot; secondaries semihyaline white, greyish externally, blackish at apical border; body blue-black, sides of collar and tegulæ ochreous, abdomen brownish at base; wings below nearly as above, but the secondaries with a large blackish oblong costal patch, followed by a small ochreous spot; legs and sides of venter spotted with bright ochreous: expanse 1 inch.

Rio Jutahi, 3rd January, 1875.

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BELEMNIA, *Walker*.

35. Belemnia crameri.

Belemnia crameri, Butler, Ann. & Mag. Ser. 4, vol. xv. p. 339.

♂ Prainha, 17th November; ♀ in a marshy spot at Prainha, 8th December, 1873.

ANYCLES, *Walker*.

36. Anycles contenta.

Euchromia (*Dipœnæ*) *contenta*, Walker, Lep. Het. i. p. 258.

Pará, 5th March, 1875.

37. Anycles rhodura.

Anycles rhodura, Butler, Journ. Linn. Soc. 1876, p. 425.

Obydos, in the forest, 23rd March, 1874.

EPANYCLES, *Butler*.

38. Epanycles imperialis.

Euchromia (*Pampa*) *imperialis*, Walker, Lep. Het. i. p. 241.

Pupunhazinho, Rio Juruá, 8th November, 1874.

39. Epanycles obscura.

Aclytia obscura, Möschler, Stt. Ent. Zeit. 1872, Tom. xxxiii. p. 348.

Epanycles stellifera, Butler, Ill. Typ. Lep. Het. i. pl. 16, fig. 10.

Rio Jutahi, 5th February, 1875.

ANDROCHARTA, *Felder*.

40. Androcharta diversipennis.

Euchromia (*Hippola*) *diversipennis*, Walker, Lep. Het. i. p. 225.

♀ Pupunha, 5th November, 1874.

41. Androcharta claripennis, n. sp.

Nearly allied to *A. parvipennis*, but the primaries with hyaline spots almost as in *A. stretchii*, the interno-median spot only being divided into two; the secondaries rather larger and without the brown apical margin; metallic

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spots and carmine streaks quite as in *A. parvipennis*; anal clasps not so slender: expanse 1 inch 9 lines.
♂ Barreiras de Jutahi, 18th January, 1875.

EPISCEPSIS, *Butler.*

42. Episcepsis venata.
Episcepsis venata, Butler, Ill. Typ. Lep. Het. i. p. 49, pl. 16, fig. 7.
Rio Jutahi, near Rio Curnem, 29th January, 1875.

SCEPSIS, *Walker.*

43. Scepsis trifasciata.
Scepsis trifasciata, Butler, Ill. Typ. Lep. Het. i. p. 49, pl. 16, fig. 11.
Jurucua, Rio Purus, 26th September, 1874.

CTENUCHIINÆ, *Butler.*

EUAGRA, *Walker.*

44. Euagra cœlestina.
Phalæna cœlestina, Cramer, Pap. Exot. iv. p. 107, pl. 345, fig. G. (1782).
Lower Amazons.
The locality and date of capture were entirely obliterated on the envelope.

EPIDESMA, *Hübner.*

45. Epidesma ursula.
Phalæna ursula, Cramer, Pap. Exot. iv. p. 107, pl. 345, fig. E. (1782).
Mamiva, Rio Purus, 28th September; Rio Sapo, 21st November, 1874; Rio Jutahi, 19th January, 1875.

THEAGES, *Walker.*

46. Theages pellucida.
Phalæna pellucida, Sepp, Surin. Vlind.
Prainha, 6th December, 1873.

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EUCEREON, *Hübner*.

47. Eucereon varium.

Euchromia (*Eucereon*) *varia*, Walker, Cat. Lep. Het. i. p. 266 (1854).

Eucereon varium, Butler, Ill. Typ. Lep. Het. i. p. 49; pl. 9, fig. 5 (1877).

Urucuri, Rio Purus, 2nd October; Pupunha, Rio Juruá, 1st November, 1874.

48. Eucereon sylvius.

Sphinx sylvius, Stoll. Pap. Exot. p. 65, pl. 14.

Pupunhazinho, Rio Juruá, 8th November, 1874; Barreira branca, Rio Jutahi, 3rd February, 1875.

49. Eucereon archias.

Sphinx archias, Stoll. Pap. Exot. p. 66, pl. 14, figs. 9, 10.

Rio Javary, 1st December, 1874.

50. Eucereon arenosum.

Eucereon arenosum, Butler, Ill. Typ. Lep. Het. i. p. 51; pl. 17, fig. 10 (1877).

Jamiry, Rio Madeira, 28th May, 1874.

51. Eucereon reticulatum.

Eucereon reticulatum, Butler, Ill. Typ. Lep. Het. i. p. 50; pl. 17, fig. 9 (1877).

Hyntanaham, Rio Purus, 27th September, 1874; Boa Vista, Rio Jutahi, 1st February, 1875.

52. Eucereon rosa.

Euchromia (*Eucereon*) *rosa*, Walker, Lep. Het. i. p. 271 (1854).

Paricatuba, Rio Purus, 11th October, 1874.

53. Eucereon complicatum.

Eucereon complicatum, Butler, Ill. Typ. Lep. Het. i. p. 50; pl. 16, fig. 12 (1877).

Rio Juruá, 26th October, 1874.

54. Eucereon marmoratum.

Eucereon marmoratum, Butler, Ill. Typ. Lep. Het. i. p. 50; pl. 16, fig. 4 (1877).

Imla, below the Rapids of Porteira, Rio Trombetas,

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1st March; Rio Negro, 14th June; Ayrão, 3rd July; near Aruman, Rio Purus, 5th September; Guajara, 6th and 7th September; Pedroso, 25th September; Mamiva, 28th September; Mabidiry, 30th September; Mouth of Rio Sapo, 13th October; Curimata, Rio Juruá, 30th October; Pupunha, 1st and 5th November; Pupunhazinho, 8th November, 1874.

Mr. Trail took twenty examples of this species.

ATYPHOPSIS, n. gen.

Allied to *Eucereon*, but with the general aspect of *Cercopimorpha;* it differs structurally from *Eucereon* in the much more transverse discocellulars of secondaries, the third median and the true radial emitted together from a short footstalk. Type, *A. modesta.*

55. Atyphopsis modesta, n. sp.

Primaries pale silky greyish-brown, with black veins and fringe; secondaries pearly hyaline white, with grey veins and fringe; body above greyish-brown; head above, collar and three central segments of the abdomen ochreous, prothorax tinted with ochreous; anal segments blackish; pectus and under surface of legs white; palpi and upper surface of legs black: expanse 1 inch 1 line.

Boaventura, Rio Jutahi, 24th January; Santarem, 4th February, 1875.

LANGUCYS, n. gen.

Allied to *Glanycus*, but with the body thickly clothed with hair, projecting greatly in front of the costal margin of the primaries, the latter being inserted only just in front of the middle of the thorax, the extremely short and convex inner margin of the primaries, the greater length of the discoidal cell, the subcostal branches crowded up near to the costal margin, the median branches more widely separated, the longer secondaries with convex costal margin, short broad triangular discoidal cell with the branches of the subcostal well separated at their origins, and the radial further from the median branches. Type, *L. nigrorufus.*

56. Langucys nigrorufus.

Glanycus nigrorufus, Walker, Lep. Het. Suppl. i. p. 283 (1864).

Trombetas, 28th February, 1874.

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NERITOS, *Walker*.

57. Neritos psamas.

Phalæna psamas, Cramer, Pap. Exot. iii. p. 72, pl. 234, G. (1782).

Rio Jutahi, near Rio Curnem, 29th January, 1875.

58. Neritos obscurata.

♀. *Neritos obscurata*, Butler, Ill. Typ. Lep. Het. i. p. 51, pl. 17, fig. 6 (1877).

♀. Prainha, 14th November, 1873; ♂. Rio Juruá, 31st October, 1874.

ELYSIUS, *Walker*.

59. Elysius optimus.

Elysius optimus, Butler, Ill. Typ. Lep. Het. i. p. 51, pl. 17, fig. 8 (1877).

Rio Juruá, 31st October, 1874.

This species is clearly allied to *E. ilus* of Cramer and apparently to *E. hermia*, which (notwithstanding my note in Journ. Linn. Soc. 1876, p. 432) appears to be allied to *E. ilus*.

AMMALO, *Walker*.

60. Ammalo chrysogaster.

Halesidota chrysogaster, Walker, Lep. Het. Suppl. i. p. 312 (1864).

♀. Manaos, 10th June, 1874.

HALESIDOTA, *Hübner*.

61. Halesidota seruba.

Charidea seruba, Herrich-Schäffer, Auss. Schm. fig. 280.

Mamiva, Rio Purus, 28th September, 1874.

This may be Sepp's *Phalæna citrina*.

62. Halesidota ænone, n. sp. (Pl. III. fig. 3.)

Primaries above semitransparent whity-brown, crossed by wavy grey lines much as in the preceding species, but with no oblique central line; a more or less marked blackish spot at the inferior extremity of the cell; secondaries hyaline white; thorax brown, abdomen creamy white; primaries below less strongly marked than above; body sordid white: expanse, ♂ 1 inch 2 lines; ♀ 1 inch 4 lines.

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Pedroso, Rio Purus, 25th September; Gepatiny, 29th September; Mabadiry, 30th September; Urucuri, 2nd October; Ilha cuxinara, Rio Solimões, 13th October; Rio Juruá, 31st October; Pupunha, 5th and 6th November; Prainha, 28th November; near Sta. Cruz, Rio Solimões, 9th December, 1874.

PHÆGOPTERA, *Herr.-Sch.*

63. Phægoptera subtilis, n. sp.

Allied to *P. breviuscula*; primaries chocolate-brown, darker towards the base and in the discoidal cell, sprinkled all over with whitish dots and with a distinct spot of the same colour at the end of the cell; secondaries semi-hyaline white, becoming ochreous towards the abdominal margin, a moderately broad greyish-brown border, very broad but indistinct at costal margin; thorax chocolate-brown; abdomen bright ochreous, with chocolate-brown anal segment; a row of four or five black spots on each side; primaries below greyer and less distinctly dotted than above, secondaries with a moderately broad brown costal border; body below brown, the sides and the centre of pectus bright ochreous: expanse 1 inch 9—11 lines.

Rio Sapo, 13th and 14th December; Marapatá, Rio Negro, 29th December, 1874; Rio Jutahi, above Rio Curnem, 29th January, 1875.

ECPANTHERIA, *Hübner.*

64. Ecpantheria obliterata.

♀. *Ecpantheria obliterata*, Walker, Lep. Het. iii. p. 691, n. 5 (1855).

♂. *Ecpantheria simplex*, Walker, l. c. p. 692, n. 7 (1855).

Barreiras de Jutahi, on grass, 14th February, 1874.

Closely allied to, and perhaps not distinct from, *E. eridanus* of Cramer.

PSYCHOPHASMA, n. gen.

Allied to *Phægoptera*, but the palpi and antennæ more slender; the upper discocellular (separated from the lower by the false recurrent vein) shorter and less oblique; subcostal five-branched, the first branch emitted immediately before the end of the cell, the second from the upper margin of the third which runs to apex, the fourth and

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fifth from the lower margin of the third; the order of the branches in point of position being 2, 5, 4, 3; the second median branch emitted nearer to the end of the cell than in *Phægoptera;* the secondaries shorter; discocellular transverse, slightly concave but not angulated; radial apparently absent, actually emitted from the terminal third of the third median, thus forming a short furca.

Type, *P. albidator,* Wlk.

65. Psychophasma albidator.

Halesidota albidator, Walker, Lep. Het. Suppl. i. p. 313, 1864.

Rio Juruá, 7th November, 1874.

This is the *H. vitripennis* of Walker and *H. erosa* of Herrich-Schäffer. *Halesidota cinerea* and *H. degenera* appear to agree in structure with *P. albidator,* and therefore may provisionally be referred to *Psychophasma.*

PERICOPIINÆ, *Butler.*

PHALÖE, *Guérin.*

66. Phalöe ithrana.

Pericopis ithrana, Butler, Ann. & Mag. Nat. Hist. p. 286 (October, 1871); Tabatinga, in the forest, 30th November, 1874.

67. Phalöe catilina.

Phalæna catilina, Cramer, Pap. Exot i. pl. 79, figs. E. F. (1779).

Serpa, in the bush, 22nd April, 1874.

ARCTIINÆ, *Butler.*

EUCHÆTES, *Harris.*

68. Euchætes aurata.

Euchætes aurata, Butler, Cist. Ent. ii. p. 38 (October, 1875).

Manaos, 6th January, 1874.

MELESE, *Walker.*

69. Melese postica.

Melese postica, Walker, Lep. Het. ii. p. 492 (1854).

Santarem, Rio Jutahi, 4th February, 1875.

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MOTADA, *Walker.*

70. Motada juruana, n. sp.

Allied to *M. lateralis*, much smaller; primaries fuliginous brown, paler beyond the middle and at base of inner margin; an indistinct irregular band across the basal third and an interrupted angulated discal band dark brown; a blackish spot on discocellulars; external angle sandy yellowish; secondaries sordid white, outer border and veins dusky, the margin and an ill-defined series of submarginal spots dark brown; body dark brown, abdomen clothed with long saffron-yellow hair; wings below sordid white; the costal borders discocellulars, and one or two spots on the disc dusky; primaries with dusky external border; body below dark brown: expanse 1 inch 1 line.

Rio Juruá, 7th November, 1874.

Family LITHOSIIDÆ.

CISTHENE, *Walker.*

71. Cisthene sanguinea, n. sp.

Primaries fuliginous brown, the outer margin and fringe slightly paler; secondaries carmine, fringe grey; head and thorax greyish-brown, antennæ testaceous; abdomen carmine, anus greyish; body below brown, legs whity-brown: expanse 11 millimetres.

Rio Jutahi, 5th February, 1875.

Allied to *C. rufibasis*, of Felder.

72. Cisthene rhodosticta, n. sp.

Primaries brown, minutely speckled with black; the basal fourth, a broad discal band with zigzag outer edge and the fringe pale straw-yellow; a carmine discocellular spot on the discal band; secondaries rose-red, the apex broadly dark brown, fringe pale straw-yellow; vertex of head shining whitish, antennæ brown, collar bright ochreous, thorax dark brown, abdomen testaceous; primaries below brown, the base inner border and discal band straw-yellow, secondaries straw-yellow, apex dark brown, body dark brown, palpi ochraceous, legs stramineous with a blackish band at the end of the tibiæ, margins of coxæ and abdominal segments stramineous: expanse 15 millimetres.

Paricatuba, Rio Purus, 11th October, 1874.

Most like *C. subjecta*, but very different.

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MÆPHA, *Walker*.

73. Mæpha lacteata, n. sp.

Primaries cream coloured, the veins and a streak on inner margin dusky; secondaries rosy, apex brown; thorax greyish, abdomen rosy; wings below cream coloured, with a tinge of pink; otherwise as above: expanse 16 millimetres.

Rio Javary, 2nd December, 1875.

74. Mæpha aurea, n. sp.

Primaries bright golden, crossed by two purplish-black lines (forming a central band), the outer one ≷-shaped; basal and discal areas longitudinally streaked with black; a black marginal line; a large carmine spot at the end of the cell; secondaries rose-red, apex black, fringe whitish; thorax testaceous, abdomen rose-red; wings below nearly as above, the carmine spot of primaries diffused; no basal black streaks; secondaries with a yellowish apical spot; body below pinky-brown, venter black banded: expanse 12 millimetres.

Rio Mauhes, 5th May, 1874.

Allied to *M. sesapina*.

JOSIOIDES, *Felder*.

75. Josioides myrrha.

Phalæna myrrha, Cramer, Pap. Exot. i. p. 47, pl. 29, fig. G. (1779).

♂. Serpa, in the bush, 25th April, 1874.

76. Josioides abscissa.

Hipocrita abscissa, Hübner, Samml. Exot. Schmett. i. Lep. iii. Bomb. ii. figs. 1—4 (1806).

♀. Serpa, in the bush, 25th April, 1874.

J. abscissa is probably a variety of the female of *J. myrrha*.

77. Josioides purpurata.

Josioides purpurata, Butler, Ill. Typ. Lep. Het. i. p. 55, pl. 19, fig. 5 (1877).

Barreiras das Araras, Rio Solimões, 16th January, 1874.

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78. Josioides mutans.

Josia mutans, Walker, Lep. Het. ii. p. 296, n. 8 (1854).

Lake Agudas, 12th April, 1874.

EUDOLICHE, *Moeschler.*

79. Eudoliche achatina, n. sp.

Allied to *E. vittata* of Möschler, but smaller, with more nearly the aspect of *Nepita frigida;* primaries fawn coloured, sprinkled and bordered with white; two transverse white belts across the base; a white spot at the end of the cell; two confluent ferruginous spots on the white border at apex; a blackish streak bounding the outer border internally and continued along the inner margin to the second white belt; secondaries greyish-brown; the borders, base and a spot at the end of the cell white; body white, metathorax brown, posterior segments of abdomen greyish; wings below white, primaries with a large brown patch which covers the greater part of the discoidal cell and the disc; base of costal area tawny; body below white: expanse 21 millimetres.

Rio Jutahi, 5th February, 1875.

80. Eudoliche sordida, n. sp.

Upper side pale greyish-brown, primaries whitish, with the apex, fringe and several spots on outer margin white; a spot at end of cell, a larger one at apex, and one or two small ones on outer margin black; the fringe opposite to the black spots brown; head, collar and tegulæ white, anus whitish; under surface more uniformly grey, not whitish, but with the white apical patch and marginal spots as above: expanse 14 millimetres.

Rio Jutahi, 31st January, 1875.

The genus *Eudoliche* is allied to *Nepita* and *Doliche.*

EUSTIXIS, *Hübner.*

81. Eustixis minima, n. sp.

Primaries cream colour; five dark brown costal spots, two or three on the disc, and two (one behind the other) at the centre of outer margin; secondaries ochreous; a grey spot at apex; head and thorax cream coloured; antennæ, excepting at the base, blackish; abdomen ochreous; under surface ochreous; wings with a central rosy flush, which is concentrated upon the veins; primaries with

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brown marginal spots somewhat as above, but connected by arched lines at apex, where the nervures are also brown; secondaries with a brown apical spot: expanse 15 millimetres.

Rio Jutahi, 31st January, 1875.

DEIOPEIA, *Stephens.*

82. Deiopeia pura.

Deiopeia pura, Butler, Trans. Ent. Soc. 1877, p. 360.

Phalæna ornatrix, Cramer, Pap. Exot. ii. pl. 166, figs. C. D. (1779).

Sta. Cruz, Rio Tapajos, 17th March, 1874.

MÆNOLENEURA, n. gen.

Neuration of the male unlike that of any Lepidopterous insect known to me; primaries with the subcostal vein very thick and widely arched, throwing off its first branch just beyond the cell, forking halfway between the cell and the outer margin, each branch forking again, the first to costa and apex, the second to outer margin, so that practically the main stem of the subcostal nervure runs to the centre of the outer margin; discocellular transverse, no radial veins; median vein with one branch, the first and second branches starting from the base as independent veins, but the second connected with the base of the third by an obliquely recurrent veinlet, the third median at its extremity joining the subcostal; the submedian and the first median almost united at their outer extremities; secondaries without costal nervure, subcostal continued to apex, its second branch being emitted from the end of the cell; discocellulars zigzag; median vein four-branched, the two last branches being emitted from a footstalk; antennæ pectinated, legs rather long; primaries of female with the subcostal vein nearly straight, first branch emitted just before the end of the cell; second some distance beyond; third immediately beyond, forking close to apex; fourth from the base of the third and below it; upper radial emitted from the superior extremity of the cell; lower radial branching from the third median near its base; discocellular transverse; secondaries with the second branch of the subcostal nearer to the first than in the male, the radial emitted near to it; discocellulars angulated; median vein as in the male; antennæ less strongly pectinated; otherwise as in the male. Type, *M. anomala.*

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83. Mænoleneura anomala, n. sp.

Fuliginous brown, primaries crossed (from basal fourth) by four zigzag dusky bars, most distinct on inner margin; secondaries darkest at outer margin; margins of eyes and sides of collar, orange; abdomen black, ochreous at the sides, with dentated margin; under surface uniform rosy brown; the bases and internal borders of the wings paler: expanse 1 inch 4 lines.

♂. Gepatiny, Rio Purus, 29th September, 1874; ♀. Araras, 15th November.

LYGROTES, n. gen.

Somewhat the aspect of the preceding genus, but the wings narrower; the first three subcostal branches parallel and close together; the two first emitted before the end of the cell; the third at the end forking halfway between the cell and apex, and emitting the upper radial from below a short distance beyond the cell; lower radial and median branches normal; discocellulars transverse and slightly concave; subcostal of secondaries forking beyond the cell; discocellulars concave, radial normal; second and third median branches emitted from the inferior extremity of the cell; antennæ simple. Type, *L. arctipennis.*

84. Lygrotes arctipennis, n. sp.

Above silky fuliginous; discocellulars of primaries black; median veins and apical half of costa spotted with black; fringe of secondaries pale: expanse 1 inch 3 lines.

Caverns near entrance to Lago Macaco, 10th September, 1874.

RŒSELIA, *Hübner.*

85. Rœselia antennata, n. sp.

Allied to *R. strigula*, general aspect of *R. ægyptiaca;* wings above sordid white; primaries with two central dark brown lines, the inner one C-shaped, the outer one widely festooned and spotted with black, three costal brown spots, the second of which unites with the C-shaped line, the third triangular, largest of the three, covering the discocellulars, it and the two lines white-edged externally; radial and median branches streaked with black almost to the spots of the outer line; a submarginal series of white-bordered pale brown spots; secon- pale brown veins; thorax white, the collar

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and tegulæ striped with brown; abdomen sordid white, with grey transverse bands; primaries below sandy yellowish, the veins dusky; secondaries white, tinted with testaceous at the borders; costal area minutely black-speckled; body below testaceous, base of venter and femora black-spotted: expanse 18 millimetres.

Tamandare, Rio Solimões, 10th January, 1874.

The male of *R. antennata* has its antennæ very distinctly pectinated from the base to the middle; Mr. Trail took what appear to be worn examples of the female in the Rio Juruá, 31st of October, and in the Rio Sapó on the 13th December, 1874.

86. Rœselia Snelleni, n. sp.

Much like *R. ægyptiaca;* primaries pale grey, the costal and outer borders pale reddish-brown, two central blackish lines exactly as in *R. ægyptiaca*, the outer one double below the sinus, which is dotted with black, white-edged externally; a subcostal black spot near the base; a short dusky litura on the costa between the central lines; a white-edged dentate-sinuate dusky discal line; secondaries chalky white with brownish marginal line; body white, collar sordid; primaries below pale brown; secondaries white with black discocellular spot; costal area brown-speckled; outer margin brownish; body white: expanse 17 millimetres.

Rio Jutahi, 26th January, 1875.

Hypsinæ, *Butler.*

Agylla, *Walker.*

87. Agylla mira, n. sp. (Pl. III. fig. 2.)

Allied to *A. fasciculata* and *A. hypotricha* (*Salopola hypotricha* of Felder); above silvery white; the costal border of primaries depressed towards the base and greyish, internal area also greyish; secondaries with a large subcostal burnt-sienna trigonate patch from the base to the end of the cell, upon it a scanty tuft of ochreous hair; area beyond the subcostal patch yellowish; head, collar, prothorax and anus greyish; large compressed lateral anal dark brown tufts; wings below snow-white, without markings; body white with black terminal anal tuft: expanse 1 inch.

Rio Javary, 5th December, 1874; Rio Jutahi, 27th January; near Rio Curnem, 29th January, 1875.

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Family MELAMERIDÆ.

Bepara, *Walker.*

88. Bepara subapicalis.

♀. *Phæochlæna subapicalis*, Walker, Lep. Het. ii. p. 470, n. 8 (1854).

♂. *Bepara egaca*, Wlk. l. c. Suppl. i. p. 143 (1864).

♂, ♀. Forest at Xibaru, Rio Negro, 26th June, 1874.

Ephialtias, *Hübner.*

89. Ephialtias basalis, n. sp.

Above jet black; primaries with an oblique ochreous postmedian belt, not reaching either margin but acuminate at its inferior extremity; secondaries with a transverse snow-white abbreviated band from the abdominal margin to the median vein, its lower edge dentated; collar below saffron-yellow; coxæ and venter white: expanse 1 inch 4 lines.

Pará, 9th March, 1875.

This species has long stood in the Museum under the name of "*Phintia basalis*," but I cannot find that it has ever been described; it is allied to *E. abrupta*, the type of the genus.

90. Ephialtias pilarge.

Josia (*Ephialtias*) *pilarge*, Walker, Lep. Het. ii. p. 305, n. 28 (1854).

Pará, 8th March, 1875.

This is the second example that I have seen of this species.

91. Ephialtias pseudena?

Retila pseudena, Boisduval, Lép. Guat. p. 94 (1870).

Uruçaca, Rio Juruá, 1st November, 1874.

This species perfectly answers to Boisduval's description of examples from Honduras and Mexico.

92. Ephialtias ena.

Retila ena, Boisduval, Lép. Guat. p. 95 (1870).

Fonteboa, Rio Solimões, 17th November, 1874.

R. enoides of Boisduval seems to be the *Josia* (*Phintia*) *lanceolata* of Walker, a new genus.

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Mitradæmon, n. gen.

Allied to *Saganis*, but the radials of primaries emitted nearer to the subcostal branches, the discocellulars more irregular, the second and third median branches emitted from a well-developed footstalk: the subcostal and median forks of secondaries of equal length, and the discocellular nervule more transverse. Type, *M. velutinum*.

93. Mitradæmon velutinum, n. sp. (Pl. III. fig. 1.)

Upper surface velvety-black; primaries with a tolerably broad oblique postmedian band of cadmium-yellow, with slightly irregular margins, not quite reaching the costal margin or the external angle; abdomen greyish at the sides; primaries below with the base and inner margin slightly greyish; venter grey: expanse 1 inch 8 lines.

Tabatinga, 30th November, 1874; Barreiras de Jutahi, 18th January, 1875.

Size, outward form and general aspect of the *Lithosiid* genus *Josioides*, but quite different in the form of the thorax and neuration of the wings.

Scotura, *Walker*.

94. Scotura venata, n. sp.

Primaries greyish-brown, with the veins white; secondaries snow-white, costa greyish; outer border broadly black-brown; body greyish-brown, with the head orange; primaries below uniformly greyish-brown; secondaries snow-white, with the costal and outer borders dark greyish-brown: expanse 1 inch 2 lines.

Rio Juruá, 4th October, 1874.

95. Scotura auriceps, n. sp.

Primaries brown, with whitish veins; an oblique white belt from the costa to the inner margin just beyond the middle of the wing; secondaries black-brown; body brown, with saffron-yellow head; under surface nearly as above: expanse 1 inch 4 lines.

Teffé (or Ega), in the forest, 19th October, 1874.

The same species occurs at Pará, but was not taken there by Mr. Trail.

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PACHIOSIA, *Butler.*

96. Pachiosia flaveolata.

Phalæna flaveolata, Cramer, Pap. Exot. i. pl. 88, fig. C. (1779).

♀. Prainha, in the woods, 6th December, 1873; St. Isabel, 25th June, 1874; ♂. Rio Javary, 4th December, 1874.

Walker and others supposed this species to be the female of *Micropus longalis*, but *P. flaveolata* is exactly similar in the pattern of both sexes.

JOSIA, *Hübner.*

97. Josia ligula.

Hipocrita ligula, Hübner, Samml. Exot. Schmett. i. Lep. iii. Bomb. 2, figs. 1—4 (1806).

Mouth of Rio Urupuana, Rio Madeira, 4th January, 1874.

98. Josia tenuivitta, n. sp.

Allied to *J. ligula*, but the orange streaks paler and of little more than half the width: expanse 1 inch 2 lines.

Serpa, 13th February, 1875.

Bates took this species at Pará.

GLISSA, *Walker.*

99. Glissa prolifera.

Josia (*Phalcidon*) *prolifera*, Walker, Lep. Het. ii. p. 302, n. 22 (1854).

Glissa bifacies, Walker, Lep. Het. Suppl. i. p. 186 (1864).

Adelphoneura nerias, Felder, Reise der Nov. Lep. iv. pl. 105, fig. 30 (1874).

♂. Tunantins, 22nd November, 1874; ♀. Santarem, 17th February, 1875.

MELANCHROIA, *Hübner.*

100. Melanchroia asteria.

Phalæna asteria, Cramer, Pap. Exot. iv. pl. 370, fig. F. (1782).

Almeirim (on a shrub "*Cunambe*"), 19th February, 1875.

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CYMOPSIS, *Felder*.

101. Cymopsis fulviceps.
Cymopsis fulviceps, Felder, Reise der Nov. Lep. iv. pl. 105, fig. 23 (1874).
Rio Juruá, 4° 40′ S., 66° 40′ W., 29th October, 1874.

Family DIOPTIDÆ.

HYRMINA, *Walker*.

102. Hyrmina Trailii.
Hyrmina Trailii, Butler, Ill. Typ. Lep. Het. i. p. 56, pl. 19, fig. 9 (1877).
Forest behind Manaos, 26th August, 1874.

LAURONA, *Walker*.

103. Laurona rufilinea.
Laurona rufilinea, Walker, Lep. Het. Suppl. i. p. 148 (1864).
♂. Serpa, in the bush, 22nd April, 1874.

Family EUSCHEMIDÆ.

PHÆOCHLÆNA, *Hübner*.

The type of this genus, *P. tendinosa*, is the only form mentioned by Walker that can be retained in it; nn. 2 and 3 belong to *Oricia*, 4 to *Josia*, 5 to *Brycea*, 6, 7 and 9 to *Virbia*, 8 to *Bepara*.

104. Phæochlæna solilucis, n. sp.
Bright saffron-yellow, primaries with the borders and two parallel oblique belts beyond the middle, dark brown; a subcostal whitish line at the base; secondaries deeper in tint, with regular blackish outer border; thorax blackish with two longitudinal yellow streaks; abdomen yellow, with a black dorsal line; wings below paler than above; body whitish: expanse 1 inch 7 lines.
Barreiras das Araras, Rio Solimões, 15th November, 1874.
A handsome species, with the general aspect of *Oricia* or *Micropus*, but with the structure of *Phæochlæna*.

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Family LIPARIDÆ.

ELORIA, *Walker.**

105. Eloria spectra.

Liparis spectra, Hübner, Samml. Exot. Schmett. iii. Phal. 2, Veræ 2, Hypog. A, figs. 1—4 (1806).

Eloria intacta, Walker, Lep. Het. iv. p. 814, n. 3 (1855).

Prainha, 25th November, 1873.

106. Eloria discifera.

Genusa discifera, Walker, Char. of Het. Lep. p. 14, n. 23 (1869).

Forest at head of Iripixy, Rio Trombetas, 31st January, 1874; Rapid of Porteira, Rio Trombetas, 2nd March, 1874.

The dilapidated specimen described by Walker is labelled "Brazil" (not "Bengal," as stated by Walker).

PACHYLÆLIA, n. gen.

Allied to *Lælia*, but the antennæ longer, with rather shorter pectinations; palpi shorter and thicker; legs thicker and more hairy; subcostal branches of secondaries emitted without a footstalk from the superior extremity of the cell; third median branch and radial from the inferior extremity, at some little distance from the second median branch. Type, *P. translucida*.

107. Pachylælia translucida, n. sp.

Primaries semitransparent white, with the borders and three nearly parallel oblique stripes pale sandy brown; secondaries hyaline white with cream-coloured costal and outer borders; body sandy brown; primaries below paler than above, the oblique stripes obsolete: expanse 1 inch 5 lines.

Prainha, 11th November, 1875.

This species, excepting in the antennæ, has somewhat the aspect of a *Hepialus*.

CAVIRIA, *Walker*.

108. Caviria substrigosa.

Caviria substrigosa, Walker, Lep. Het. iv. p. 825, n. 1 (1855).

♂. Ayrão, Rio Negro, 3rd July, 1874.

* Identical with *Penora*, Wlk. p. 821.

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ARCHYLUS, *Walker*.

109. Archylus nigrisparsus, n. sp. (Pl. III. fig. 8.)

Silky snow-white; primaries above with eight black spots at about the middle as follows: four in an oblique series, one, smaller above the second and third of the oblique series, and three, small, below the same spots; pectinations of antennæ fulvous: expanse ♂ 1 inch 1 line; ♀ 1 inch 7 lines.

♂. West end of Ilha de Perarara, Rio Solimões, 14th October; ♀. Barreiras das Araras, 15th November, 1874.

SULYCHRA, n. gen.

Allied to *Archylus*, but the body more slender; the primaries narrower; the branches of the subcostal vein closer together and more parallel; the extremities of the cell parallel, the angle of the discocellulars exactly in the middle; the branches of the median vein emitted nearer together; secondaries with the discocellulars angulated in the middle as in primaries; the second and third median branches emitted almost from the same point. Type, *S. argentea*.

110. Sulychra argentea, n. sp.

Silvery white; the antennæ with brown pectinations; the abdomen above orange, banded with black, and sparsely clothed with white hairs: expanse ♂ 1 inch 2 lines; ♀ 1 inch 4 lines.

♀. Rio Juruá, 7th November; ♂. Rio Javary, 7th December, 1874.

This is a small delicate-looking species.

CARAMA, *Walker*.

111. Carama pura, n. sp.

Most nearly allied to *C. Walkeri*, but smaller; the abdomen pure white; the thoracic tufts less prominent; the pectinations of the antennæ testaceous instead of reddish; the frons, prothorax below and anterior tibiæ pale brown: expanse 1 inch 3 lines.

Rio Juruá, 7th November, 1874.

Family NOTODONTIDÆ.

EDEMA, *Walker*.

112. Edema pulchra, n. sp. (Pl. III. fig. 6.)

♀. Aspect of *E. albifrons* more like *E. mumetes* in

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pattern; primaries silvery-grey, tinted with pinky-brownish and sulphur-yellow, and irrorated with dark brown; costal patch broader and less dentated than in *E. albifrons*, its lower border sulphur-yellow, bounded by a broad sepia-brown irregular oblique band or patch; a transverse dentated line bounding the basal area, which is pale sulphur-yellow varied with dark brown at the base; a second dentated line across the disc, followed by an undulated submarginal line and an interrupted sinuated marginal line—all these lines black; inner border yellow, brown-speckled; secondaries dark pinky-brown, with interrupted marginal black line and whity-brown fringe; body corresponding in colour with the opposite wings; primaries below dark shining greyish-brown; costal and apical borders whitish-speckled; four white costal dots towards apex; a submarginal series of black dots; fringe brown, spotted with white at the end of each vein; secondaries dark shining greyish-brown, with the costal and abdominal areas broadly whitish; body below whitish: expanse 1 inch 9 lines.

Aveyros, Rio Tapajos, 11th March, 1874; Boa vista, Rio Jutahi, 1st February, 1875.

113. Edema mumetes.

Phalæna (*Tortrix*) *mumetes*, Cramer, Pap. Exot. i. pl. 82, A. (1779).

Rio Mauhes, 5° 30′ S., 29th April, 1874; Rio Javary, 7th December, 1874.

Calledema, n. gen.

Allied to *Edema*, neuration almost identical; antennæ less strongly pectinated in the male; body much longer, projecting more in front of the wings; palpi longer; abdomen of male with long and dense lateral and terminal compressed pencils of hair scales.

Type, *C. marmorea*.

114. Calledema marmorea, n. sp.

♂. Primaries above dark greyish-brown, crossed (particularly towards the base) by short blackish parallel lines; interno-basal area varied with whitish; orbicular spot small, outlined in whitish; reniform oblong, somewhat constricted towards the centre, outlined in ochraceous

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yellow, the basal portion of the subcostal and upper radial veins also of the same colour; apical area to beyond the middle of the costal margin cut off by a very oblique silvery-white streak, within which, at apex, is a large almost lunate patch of white and yellow, spotted with grey and marked close to apex with two black dots, area behind this patch crossed by three or four whitish lines; apical costa white spotted; an indistinct discal zigzag pale line; a straight submarginal white line, which becomes yellow at external angle, and between it and the margin (which is cream coloured) a regularly zigzag white line; fringe brown, spotted with white at the termination of the nervures; secondaries sordid whity-brown, with silky costal area; a very broad dark brown external border; fringe white; head above sordid white, spotted with ferruginous; collar burnt sienna; thorax dark greyish-brown; tegulæ pale at the sides; abdomen pale greyish-brown, whity-brown at base; primaries below fuliginous brown; costa from the middle alternately black and white; apex white, with one brown lunate spot upon it; outer border white towards apex and dotted with black, otherwise occupied by white-bordered brown lunules; fringe as above; secondaries paler than above; body below white; sides of palpi and upper surface of tibiæ blackish, sprinkled with ferruginous; tarsi black, banded with white; all the legs throughout densely clothed with long hair: expanse 1 inch 10 lines.

Lake Cararaucu, 7th April, 1874.

115. Calledema sodalis, n. sp. (Pl. III. fig. 7.)

♀. Allied to the preceding species, but paler, the primaries with a yellow-edged fusiform oblique marking in the cell; a longitudinal yellow streak below the cell, terminating at each end in white semicircular markings, the outer one well defined, tinted with yellow and edged with black; apical area broader, the silvery streak being more oblique, the two last branches of the subcostal (as well as the main branch and upper radial) white instead of yellow; apical patch white, more quadrate, its inner area crossed by a yellowish belt, the lower portion of its outer area enclosing two grey spots; markings of external border better defined; secondaries whiter, outer border much narrower; body paler, anal segment of abdomen reddish; primaries below with the outer and inner borders, the costal margin and a streak from the cell to the outer

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margin white, a subapical ferruginous transverse streak; a submarginal series of black dots; secondaries white, a brown subcostal basal streak; a dentated blackish patch at centre of outer border; body below white; sides of palpi (excepting at their inferior margin) and tibiæ above dark brown, tarsi dark brown banded with white: expanse 1 inch 8 lines.

Amazons (exact locality and date entirely obliterated).

LEPTOSPHETTA, n. gen.

Aspect of *Sphetta*, but readily distinguished by the much narrower primaries, long falciform palpi which project noticeably above the top of the head; antennæ minutely pectinated as in *Calledema;* body extending a little beyond the secondaries; hind tibiæ and back of pectus clothed with dense long hair; secondaries below with a patch of thickened scales over the end of the cell; cell rather short, median vein four-branched, the last two branches emitted from a footstalk beyond the cell. Type, *L. rabdina.*

116. Leptosphetta rabdina, n. sp.

Primaries above olive-green, changing to flesh colour towards the internal border; costal border, excepting at base and apex, occupied by a bright silver streak; one or two vague central transverse blackish lines and a black spot at the end of the cell, a whitish-bordered dentate sinuate blackish discal line; a marginal series of black spots; fringe whitish, intersected by an olivaceous line; secondaries grey with a pinky shot, fringe white; body sordid whitish, collar and prothorax olive-green; abdomen with a basal ochraceous belt, anal segments ochraceous; palpi ferruginous at the sides; wings below grey, tinted with lake-red; primaries, with the discoidal area blackish, costal border sordid lake-red towards the base, sandy yellowish towards the apex; a marginal series of black spots, fringe whitish; secondaries with a black patch over the end of the cell, fringe whitish; body below whitish, collar reddish; anterior legs very slender, brown above, banded laterally with blackish; posterior tibiæ and back of pectus clothed with long lake-red hair: expanse 1 inch 6 lines.

Rio Jutahi, near Rio Curnem, 29th January, 1875.

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ROSEMA, *Walker*.

117. Rosema epigena?

Phalæna (*Bombyx*) *epigena*, Sepp, Surin. Vlind. p. 227, pl. 102 (1848).

Rosema demorsa, Felder, Reise der Nov. Lep. iv. pl. 96, fig. 11.

♀. Mouth of Rio Sapo, 14th December, 1874.

I have very little doubt that Sepp's figure is intended to represent Felder's species.

Walker erroneously referred the genus *Rosema* to the *Drepanulidæ*; it belongs to the *Notodontidæ*, being allied to *Phalera*, *Moresa* and *Cyphanta*.

ETOBESA, *Walker*.

118. Etobesa xylophasioides, n. sp.

Allied to *E. xylinoides*, the wings slightly broader; primaries above whitish, irrorated with reddish-brown; the veins, longitudinal lines between them, an irregular oblique belt from outer border near apex to inner margin towards the base, a submarginal series of hastate spots and the greater part of the fringe red-brown; apical third of costal margin spotted with black; secondaries red-brown, paler towards the base; frons and thorax white, collar and abdomen red-brown; under surface white, a few vague red-brown streaks on the discs of the wings, confined in the secondaries to a patch near the outer border: expanse 1 inch 8 lines.

Rio Juruá, 6th November, 1874.

TIFAMA, *Walker*.

119. Tifama chera.

Phalæna chera, Drury, Ill. Exot. Ent. ii. pl. 20, fig. 4; Cramer, Pap. Exot. iv. pl. 308, F. (1782).

Tifama simois, Walker, Lep. Het. v. p. 1078 (1855).

Mouth of Rio Purus, 9th October, 1874.

This is also, in all probability, the *P. megalops* of Sepp. Walker quoted the wrong figure from Cramer, and, consequently, gave the name of *P. simois*, a species of *Limacodid* of the genus *Bombycocera*, to this insect.

120. Tifama exusta, n. sp. (Pl. III. fig. 10.)

Allied to the preceding; primaries above sordid white,

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tinted with flesh colour in the centre, and clouded with brown; apical third of costal margin and centre of the veins on the disc alternately black and white; a very large V-shaped brown-bordered grey patch at external angle, occupying half the internal and nearly half the external border; a whitish submarginal dash cut by the lower radial nervure; a marginal series of brown spots, bounded internally by a series of hastate white spots from the apex to the second median interspace; fringe brown, spotted with white; secondaries greyish-brown with a broad dusky outer border; fringe sordid white, spotted with blackish; body brown, head reddish; tegulæ with white external borders; primaries below greyish-brown, with a broad discal <-shaped belt of dark grey; borders whitish; apical third of costa and outer margin spotted with blackish; secondaries white; costal area brown-speckled; a broad greyish-brown outer border not quite reaching the costal or abdominal margins; body below sordid whitish, legs greyish, tarsi black, banded with white above: expanse 1 inch 10 lines.

Rio Jutahi, 5th February, 1875.

Closteromorpha, *Felder.*

121. Closteromorpha modesta, n. sp.

Allied to *C. reniplaga*, same general form and coloration; wings above silky, laky-brown; primaries with the apical area (bounded internally by two white lituræ indicating the reniform spot) abruptly darker; reniform spot and costal border from above it to outer border, washed with shining plumbageous grey; a pyriform whitish-bordered blackish spot immediately beyond the reniform spot and occupying about a quarter of the apical area; four transverse dusky lines, all excepting the second with a pale border, the first straight and oblique crossing the basal third of the cell, the second parallel to it but not continued above the median vein, the third 7-shaped, terminating at the second median branch, the fourth very irregular, submarginal, terminating close to the costa in a small white spot; apical fourth of costal margin spotted with testaceous; body laky-brown; wings below altogether paler, shining greyish; the primaries with blackish discoidal area; pectus whitish: expanse 1 inch 5 lines.

Parentins, 1st April, 1874.

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OLCECLOSTERA, n. gen.

Allied to *Ichthyura*, but the abdomen very slender; the primaries with straight outer margin, angulated and excised below apex; secondaries with considerably longer inner margin; outer margin angulated at submedian vein; antennæ tolerably long and well pectinated; palpi thick, compressed, with extremely short terminal joint; tibiæ clothed with long compressed hair; a well-defined anal scale-tuft to the abdomen. Type, *O. irrorata*.

122. Olceclostera irrorata, n. sp.

Upper surface ferruginous brown; primaries much darker than secondaries, the basal area irrorated with whitish scales; two chocolate-brown oblique central lines, elbowed towards the costal margin; discocellulars transverse, black; veins on the disc whitish; a disco-submarginal chocolate-brown line, oblique to upper radial interspace, where it joins a golden spot, thence to the inner margin it is sinuated; secondaries with the abdominal area dusky, the discocellulars, two discal lines and the outer margin dusky; thorax much darker than the abdomen, irrorated with whitish scales; wings below paler and redder than above, the costal areas of all the wings irrorated with white scales; two dusky parallel discal lines; secondaries with the veins and abdominal area irrorated with whitish scales; body below irrorated with whitish; legs clothed with brown hair; venter with a series of white dots on each side: expanse 1 inch 5 lines.

Boa vista, Rio Jutahi, 1st February, 1875.

ORTHOCLOSTERA, n. gen.

Allied to *Ichthyura* and the preceding genus, differs from both in its narrow primaries, with straight (or nearly straight) margins, antennæ with long pectinations for nearly two-thirds of their length; and from the former it differs also in the absence of a defined anal tuft to the abdomen. Type, *O. peculiaris*.

123. Orthoclostera peculiaris, n. sp.

Primaries above purplish-brown, with an interno-basal brownish patch followed by a central whity-brownish band

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(which tapers obliquely above the median vein and does not reach the costa), this band followed again by parallel ferruginous, whity-brown, slaty-grey and dark brown lines and streaks, which are continued to outer border; a whitish-diffused apical dash; a submarginal series of black dots; fringe spotted with slaty-grey; secondaries silky brown, becoming almost black towards the apex; fringe white, varied with brown spots; body reddish-brown, with the sides of the tegulæ and base of abdomen grey; primaries below shining greyish-brown; costal border testaceous almost to apex, near which it becomes red and is crossed by two yellow lituræ, the first of which is continued as an indistinct paler oblique line across the disc; a submarginal series of blackish dots; fringe whitish at base; secondaries sordid white, crossed by four ill-defined dusky lines, the fourth of which limits a dusky outer border; costal area minutely brown-speckled; body below whitish: expanse 1 inch 2 lines.

Rio Negro, 4th July, 1874.

In the structure of its antennæ and the general pattern of the primaries this species approaches *Ingura producta*, near to which, perhaps, it ought to be placed; but I do not think that *Ingura* ought to be retained among the *Noctuites*.

LEPASTA, *Moeschler*.

(*Nystalea*, Felder ex parte.)

124. Lepasta conspicua, n. sp.

Closely allied to *N. grammodes* ♀, but smaller, considerably paler, the secondaries and abdomen being greyish whity-brown, the ⊓-like band of primaries broader, more regular and whiter, with the intersecting line ill-defined; a comma-shaped marking between the two cuneiform spots; under surface silky white: expanse 1 inch 3 lines.

Rio Negro, 4th July, 1874.

This species has a remarkable recumbent crest projecting backwards from the base of the antennæ; the pectinations of the latter are short, even at the base, and are composed of little hair pencils; the single example taken appears to me to be a male, from its possession of lateral short compressed tufts at the base of the abdomen, as well as the anal tuft. I therefore doubt the specific identity of the sexes associated under the name of *N. grammodes*.

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MAGAVA, *Walker*.

125. Magava multilinea.

Magava multilinea, Walker, Lep. Het. Suppl. ii. p. 503 (1865).

♂. Tamandaré, Rio Solimões, 10th January, 1874.

The type from Limas is a ♀.

MASCHANE, *Walker*.

126. Maschane erratipennis.

Maschane erratipennis, Walker, Lep. Het. xxvii. p. 3 (1863).

Rio Juruá, 4° 40′ S., 66° 40′ W., 29th October, 1874.

One example was obtained of this rare species.

127. Maschane simplex.

Maschane simplex, Walker, Lep. Het. xxvii. p. 3 (1863).

Fáro, 10th April, 1874.

Also one example of this species.

128. Maschane cæsia.

Dylomia cæsia, Felder, Reise der Nov. Lep. iv. pl. 97, fig. 14.

Rio Javary, 4th to 6th December, 1874.

Three examples were obtained of this species.

Pontana rubrana of Walker (an allied genus to *Maschane*) is identical with Felder's *Platyodonta calpe*.

Family LIMACODIDÆ.

RHESCIPHA, *Walker*.

General aspect of *Torone*, but differing in structure; more nearly allied to *Hyphorma*; palpi elongated compressed, rising high above the head, the terminal joint fringed with long scales, antepenultimate segment of abdomen with long lateral brushes of hair; tibiæ fringed with long hair; primaries hamate at apex, outer margin sinuated and deeply excised at external angle; second and third median branches and lower radial of primaries emitted close together; cell of secondaries short; median vein four-branched, the radial being emitted from the inferior extremity of the cell. Type, *R. servia*.

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129. Rhescipha servia.

Phalæna (*Bombyx*) *servia*, Cramer, Pap. Exot. iv. pl. 321, fig. E. (1782).

Manaos, 26th December, 1874.

This genus would perhaps be better placed among the Pseudo-Deltoids, but in these extreme forms it is difficult to decide. Walker's type is scarcely distinct.

Dalcera, *Herrich-Schäffer.*

Acraga and Dalcera, *Walker.*

130. Dalcera abrasa.

Dalcera abrasa, Herr.-Sch. Auss. Schm. i. fig. 180.

Ilha das Araras, 8th June, 1874.

Stætherinia, n. gen.

Allied to *Scopelodes*, but the costa of primaries strongly arched, the outer margin deeply excised below apex, the inner margin nearly straight; the subcostal vein four-branched,* the first two branches running close to the costa, the third and fourth forming a very long fork, upper radial emitted from the upper extremity and lower radial (as a fourth median branch) from the lower extremity of the cell; discocellulars much less acutely angulated; secondaries ample, cell much longer, lower discocellular much longer; palpi rather longer, quite as densely hairy and strongly pectinated along their inferior margins; legs considerably shorter. Type, *S. semilutea.*

131. Stætherinia semilutea.

Oxytenis semilutea, Walker, Lep. Het. Suppl. v. p. 1942 (1866).

Boaventura, Rio Jutahi, 24th January, 1875.

Miresa, *Walker.*

132. Miresa amazonica, n. sp.

Wings and body above pale rufous-brown; primaries with a central white-edged dark patch, lilacine-greyish in the cell and beyond it, divided upon the discocellulars by a transverse oblong ferruginous spot, the lower part of the

* In *Scopelodes* it is five-branched, and the first two branches are emitted at some distance from the costal margin.

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patch contracted and ferruginous from below the first median branch; a dentate sinuate discal white line, which towards apex encircles two or three small fuliginous brown spots; a marginal series of small white spots; secondaries with a marginal interrupted whitish line; under surface whity-brown; primaries opaline beyond the middle; the border, between the veins, bluish-opaline; secondaries with a sandy-brownish oblique central belt; outer border slightly opaline; body sandy-yellowish: expanse 1 inch 4 lines.

Rio Javary, 1st December, 1874.

Somewhat similar to one or two Indian species which I have seen in Mr. Moore's collection; it is the first apparently typical *Miresa* that I have seen from the New World.

NEOMIRESA, n. gen.*

Nyssia, Walker (nec Guenée).

Walker wrongly applied this name in full consciousness of the fact; actually stating that it was preoccupied at the foot of the page (cf. Lep. Het. v. p. 1132).

133. Neomiresa rufa, n. sp.

♂. Wings above rufous-brown; primaries with the interno-median and discal areas dark reddish-brown; a black spot in the cell; outer and inner margins and veins pale and sericeous; a <-shaped marking below the cell and behind it two dots (together almost making a 3), and a series of discal dots beyond the cell, metallic silver; secondaries with a pale sericeous outer margin; under surface paler than above, with paler shining veins and margins; primaries with the disc opaline between the veins; body sericeous: expanse 1 inch.

São Paulo, 26th November, 1874.

The smallest species known to me.

134. Neomiresa argentata.

Nyssia argentata, Walker, Lep. Het. v. p. 1134 (1855).

Juruapuca, Rio Juruá, 11th November, 1874.

The single example taken by Mr. Trail is smaller and altogether brighter in its colouring than Walker's type.

* Type, *N. argentata*, Walker.

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135. Neomiresa nesea.

Phalæna (*Bombyx*) *nesea*, Cramer, Pap. Exot. iv. pl. 305, fig. C. (1782).

Phalæna (*Bombyx*) *vidua*, Sepp, Surin. Vlind. i. pl. 6 (1848).

Nyssia fumosa, Walker, Lep. Het. v. p. 1134 (1855).

Rio Purus, above Aruman, 9th September, 1874.

Natada, *Walker*.

136. Natada sericea, n. sp.

Wings above silky whity-brown; primaries from near the base to the middle mottled with tawny; costal margin tawny; abdominal area of secondaries hairy; body rather redder than the wings; antennæ white with greyish-brown pectinations; under surface paler, wings sericeous, primaries slightly reddish towards the base; front of pectus, femora and tibiæ reddish: expanse 1 inch.

Amazons (exact locality and date obliterated).

This species has the mottled shining character of the species of *Redoa*.

Talima, *Walker*.

137. Talima latescens, n. sp.

Allied to *T. postica*, from which it differs in its broader wings, the more uniform gravel-red coloration of the primaries and body; outer border of primaries slightly lilacine, wider, limited internally by a slightly concave but nearly straight oblique chocolate-brown line parallel to the outer margin; a black discocellular dot; secondaries sandy-yellow instead of white, with lilacine brownish internal streak extending nearly to the base; thorax washed at the sides with lilacine; abdomen tinted with lilacine from the second segment, pale at the sides; anterior tibiæ and tarsi yellow, femora of second pair of legs whitish, remainder of legs purplish-brown above, ochreous below, venter sericeous whitish: expanse 22 millimetres.

Boaventura, Rio Jutahi, 24th January; Rio Jutahi, 5th February, 1875.

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Family SATURNIIDÆ, *Walker*.

Genus HYPERCHIRIA, *Hübner*.

138. Hyperchiria approximans.

Hyperchiria approximans, Walker, Lep. Het. vi. p. 1311 (1855).

On board the Yeamiaba, Manaos, 30th August, 1874.

This species agrees very fairly with Walker's description.

139. Hyperchiria canitia.

Phalæna (*Attacus*) *canitia*, Cramer, Pap. Exot. iv. pl. 304, fig. D. (1782).

Praia de Rebeiro, Rio Solimões, 27th November, 1874.

The single example agrees tolerably with Cramer's figure.

Walker refers *H. canitia* to *Dirphia*, never noticing how closely allied it is to his *Hyperchiria approximans*.

These two species would perhaps be more correctly referred to the genus *Dirphia*, but this can only be settled by a careful comparison of the structure of the two groups: Boisduval appears to have redescribed them as species of *Io*.

140. Hyperchiria io.

Bombyx io, Fabricius, Syst. Ent. p. 560, n. 16 (1775).

Conceicão, Rio Negro, 15th June; on board the Manado, Santarem, 21st March, 1875. Boisduval has renamed this *H. Fabricii*.

141. Hyperchiria stollii.

Io stollii, Boisduval, Ann. Soc. Ent. Belge, xviii. p. 228 (1875).

Uruçaca, Rio Juruá, 9th November, 1874.

Genus AUTOMERIS, *Hübner*.

142. Automeris scapularis.

Io scapularis, Boisduval, Ann. Soc. Ent. Belge, xviii. p. 236, n. 49 (1875).

Prainha, 9th December, 1873.

143. Automeris serpina, n. sp.

Above rosy-brown, pale; primaries subfalcate; the extrabasal line ill-defined, transverse, slightly inarched, but barely distinguishable above the median vein; discal line

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oblique, smoky brown, terminating at more than half an inch from the apex, bordered internally by a diffused ferruginous belt, which expands gradually towards the costa; apical area washed with the same colour; a broad but indistinct irregular outer border very slightly paler than the ground colour, a greyish patch edged with a few dusky dots at the end of the cell; secondaries slightly greyer, with the ocellus large, sooty grey, with a central black spot crossed by an oblique white line, surrounded by a dull black border, followed by a broad diffused ochraceous zone; discal line black, semicircular, not undulated, followed by a greyish semicircular belt; thorax pale chocolate-brown, abdomen testaceous; under surface of a slightly more sandy tint than above; primaries with a dull black-bordered, white-pupilled grey central ocellus; discal line diffused, greyish; secondaries with a white spot at the end of the cell: expanse 3 inches 11 lines.

Serpa, in the bush, 24th April, 1874.

Allied to *A. palegon* of Boisduval, and apparently in some respects resembling *A. orestes* of the same author.

Family BOMBYCIDÆ, *Stephens.*

Genus ASTHENIA, *Westwood.*

144. Asthenia lactucina.

Phalæna (*Geometra*) *lactucina*, Cramer, Pap. Exot. ii. pl. 133, fig. C. (1779).

Mouth of Rio Urupuana, Rio Madeira, 4th June, 1874.

This genus bears a striking resemblance to the *Geometrid* genus *Micronia.*

Genus PEROPHORA, *Harris.*

145. Perophora Trailii, n. sp.

♀. Allied to *P. Batesii*, but smaller and greyer; the transverse oblique elbowed line darker and distinctly bordered externally by a whitish stripe; primaries with an oblique hyaline-white discocellular fasciole; secondaries with the margin sinuated, fringe very short: expanse 1 inch 10 lines.

Ilha Cuxinara, Rio Solimões, 13th October, 1874.

146. Perophora Bactriana, n. sp.

Allied to *P. strigipennis* and *P. hamata;* sericeous pale reddish-brown, irrorated with blackish, with the usual oblique elbowed line dark grey; fringe reddish-brown, intersected by a darker line; primaries with an

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oblique grey spot on the discocellulars, a grey spot above the latter on the costal border; a small black spot on the middle of the cell, below it on interno-median interspace a <-shaped grey marking, and, nearer to the base, a black spot; area immediately beyond the discal line slightly suffused with grey; secondaries with the discal area greyish; wings below more distinctly speckled with black; elbowed line of primaries broken up into grey spots; grey discocellular spot as above; secondaries with an arched discal series of blackish Λ-shaped markings; abdomen speckled with black: expanse 2 inches 5 lines.

Emerged on the 27th February, 1874, from a cocoon found on *Bactria* in Paramacu forest.

PRISMOPTERA, n. gen.

Allied to *Ernolatia*, but differing entirely in the neuration of primaries; the subcostal vein running parallel to the costal margin throughout its entire length, emitting only two branches from its inferior margin beyond the cell (in *Ernolatia* the second branch breaks up into three, so that its subcostal may be said to be five-branched, the continuation of the main stem being counted); costal margin considerably more arched towards the apex; outer margin nearly straight instead of elbowed; anal angle of secondaries less produced. Type, *P. opalina*.

147. Prismoptera opalina, n. sp. (Pl. III. fig. 9.)

Wings transparent white with prismatic reflections; margins and veins opaque; three pairs of sandy-yellow spots on the costa; indications of several parallel undulated central greyish lines; outer border and a submarginal series of lunate spots indistinctly greyish; secondaries with a small cadmium-yellow spot on abdominal margin near anal angle; head above and main stem of antennæ white; pectinations of antennæ fulvous; thorax and collar sordid ochreous, speckled with opaline scales, white at the sides; abdomen whitish; body below white, front of pectus ochreous, legs (excepting the tarsi) brownish: expanse 1 inch 5 lines.

Prainha, 14th November, 1873.

ANTHOCROCA, n. gen.

Allied to *Bombyx* and *Norasuma*, but differing from them in structure just as *Prismoptera* does from *Ernolatia*; from the preceding genus it differs (as *Norasuma*

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does from *Ernolatia*) in its densely-scaled opaque wings, comparatively slightly shorter antennæ, and more prominent thorax. Type, *A. domina*, Cramer.

148. Anthocroca muscosa, n. sp. (Pl. III. fig. 5.)

Allied to *A. domina*, but the apex and central area of primaries clouded with bright sap-green; the white discal spots replaced by lilacine-grey ones; the discal black line finer; two additional arched convergent brown lines across the basal half of the wing; secondaries with the discal line finer, a bright yellow spot above its inferior extremity; anal area bright laky-red, with a patch of bright yellow along the anal third of outer border; body paler than in *A. domina:* expanse 2 inches 7 lines.

Mouth of Rio Jutahi, 18th January, 1875.

One of the most beautiful of New World moths.

149. Anthocroca cuneifera, n. sp. (Pl. III. fig. 4.)

Brownish flesh-colour (or colour of cork); wings with a black discal line as in the preceding species; primaries with a large greenish-yellow ferruginous-bordered costal cuneiform patch, an oblique ∩-shaped ferruginous line on internal area, enclosing one or two yellow spots, and bounded internally on the inner border by a spot of the same colour; an arched black line across the base of the wing; basal third of costal margin black; discal black line edged with lilacine, and bounded on second median interspace by a white spot, apical area irregularly yellow, with a ferruginous internal line; outer border, excepting at external angle, irregularly whitish; secondaries with the discal line greyish, becoming abruptly ferruginous below the first median vein, and bounded above by a bright yellow spot; anal angle and a series of marginal spots, only divided by the nervures, bright chrome-yellow; fringe, excepting at anal angle, ferruginous; collar and tegulæ sordid yellowish, the latter with a posterior dusky band; abdomen yellowish along the dorsal region; wings below bright yellow, clouded here and there with ferruginous, with two blackish subparallel discal lines; internal area of primaries pinky-whitish: expanse 1 inch 9 lines.

Ayrão, Rio Negro, 3rd July, 1874.

150. Anthocroca hiemalis, n. sp.

Primaries above dark purplish-brown, crossed by four undulated purple lines, two across the basal area and two

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across the disc; post-discoidal area crossed by copper-red veins; a subapical spot, a small spot on the disc, and the centre of internal area ochraceous; base whitish; secondaries olivaceous towards the base; anal angle reddish; outer border and two converging waved discal lines purple; base and basal three-fifths of abdominal area whitish; frons pale reddish, crest dark red, collar yellow, thorax pinky-whitish, tegulæ greyish; abdomen whitish, clouded with ferruginous and grey; primaries below fuliginous brown, with the costal margin tawny; subapical area dusky; two undulated purplish-black discal lines, the inner one not extending below the second median branch; internal border whitish; secondaries reddish flesh-colour, with a white-speckled blackish internal streak; two undulated purplish-black discal lines, the inner one elbowed towards the costa, the outer one convex; body below pale red: expanse 1 inch 6 lines.

Rio Juruá, 6th November, 1874.

Genus Dirphia, *Hübner*.

151. Dirphia javarina, n. sp.

Wings above pale pinky-brown; primaries with a broad central chocolate-brown belt, three times as wide on the costal as on the inner margin and whitish bordered, its inner edge oblique and waved, its outer edge straight; basal area suffused with chocolate-brown, the base itself blackish and bounded externally by an oblique whitish line; a slightly irregular discal brown band, which becomes abruptly wider above the upper radial; apex ochreous, diffused; fringe chocolate-brown; secondaries reddish towards the base; external area pink, regularly limited internally and enclosing a regular arched belt of the ground colour; fringe red-brown; thorax deep chocolate-brown, blackish; abdomen tawny, deep red at the sides, crossed at the base by two black belts; wings below paler than above, the costal areas red-brown; two discal belts; apices ochraceous; discal belts of primaries parallel, slightly sinuated; the inner belt of secondaries straight, the outer one arched and parallel to the outer margin; body below deep chocolate-brown, anus reddish: expanse 5 inches 4 lines.

On board the Guajara, Rio Javary, 2nd December, 1874.

Allied to *D. avia* and *D. concolor*.

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Genus HYDRIAS, *Herrich-Schäffer.*

152. Hydrias albidifascia.

Hydrias albidifascia, Walker, Lep. Het. vi. p. 1402 (1855).

Rio Solimões, 9th December, 1874; Rio Jutahi, 25th January, 1875.

153. Hydrias rivulosa.

Hydrias rivulosa, Moeschler, Schmett.-Fann. Surin. p. 47, pl. 10, fig. 39 (1878).

Pupunhazinho, Rio Juruá, 8th and 12th November, 1874.

Nearly allied to the preceding species; Herr Moeschler's description is just published.

154. Hydrias fasciolata, n. sp.

Primaries ferruginous, with a central belt and a subapical streak irrorated with whity-brown; a black-edged pale brown litura at the end of the cell; a dark-edged discal zigzag whitish line; a submarginal series of white-bordered black spots; secondaries as in the two preceding species, but greyer; thorax and sides of abdomen brown; centre of abdomen whitish, crossed by abbreviated black bars or spots; wings below uniformly pale reddish-brown, with a submarginal whitish-bordered grey streak; secondaries crossed in the middle by a straight diffused greyish streak; body rather paler than the wings: expanse 1 inch 6 lines.

Amazons. No exact locality or date.

155. Hydrias morosa, n. sp.

Fuliginous brown; primaries with the basal area blackish; an irregular white-speckled central belt limited by two zigzag black lines; a ≤-shaped submarginal series of black spots; fringe dark, intersected by a paler line; secondaries with whitish apical area, bounded within by a central dusky transverse line; an apical blackish spot; thorax darker than abdomen; under surface considerably paler sericeous, especially along the veins of the wings: expanse 1 inch.

Lake Cararaucu, 17th April, 1874.

156. Hydrias distincta.

Allied to *Hydrias nocens,* but the wings of a more uniform pale reddish-brown tint; markings similar, ex-

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cepting that there is a large black patch at the base of the primaries: expanse 1 inch 7 lines.

Rio Juruá, 12th November, 1874 (two males).

157. Hydrias plana.

Hydrias plana, Walker, Lep. Het. vi. p. 1402 (1855).

Rio Jutahi, 27th and 30th January, 1875.

H. mollis of Sepp is allied to this species (Surin. Vlind. pl. 22).

158. Hydrias obsoleta?

Phalæna (Attacus) obsoleta, Cramer, Pap. Exot. iv. pl. 304, fig. C. (1782).

♀. Parana, 6th June, 1874; ♂. Rio Juruá, 6th November, 1874.

What I take for the male is allied to *H. rubiginosa* of Felder.

159. Hydrias melancholica, n. sp.

Allied to *H. incivilis* but altogether darker, the primaries longer and rather narrower, not red at base; the discal spots of all the wings less black; secondaries with no red on the subcostal branches, abdominal half of the wing very slightly paler than the costal area; dotted white lines similar; under surface altogether darker and greyer: expanse 1 inch 5 lines.

Rio Solimões, 9th December, 1874.

160. Hydrias erebina, n. sp.

Primaries above fuliginous brown, very dark; internal area paler; a very pale external semicircular apical patch, crossed by a slightly undulated and centrally angulated black submarginal line; a slightly zigzag discal series of whitish dots from costal to inner margin, and a second less distinct but similar series across the basal third of the wing; secondaries paler brown, sericeous; apex of costal area blackish, crossed by a whitish spot; body corresponding in colour with the wings, the thorax being dark and the abdomen lighter; under surface altogether paler, wings sericeous pale brown, with the veins whitish; costal margins and subcostal branches more or less clay-coloured; subcostal area, excepting at apex, greyish; each wing with a white costal spot towards apex; primaries with an oblique apical white patch; a submarginal series of greyish spots; body below tinted with pink: expanse 1 inch 1 line.

Cupari, Rio Negro, 19th June, 1874.

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161. Hydrias terranea, n. sp.

Pale reddish-brown, washed with dull greyish; primaries with a bisinuate discal series of black dots; fringe with a paler basal line; secondaries becoming whity-brown at the base; under surface greyish with the wing-veins whity-brown: expanse 1 inch.

Serpa, 13th February, 1875.

Genus Ocha, *Walker.*

162. Ocha turpis, n. sp.

Fuliginous brown; primaries crossed by a central angulated narrow white-edged chain-like band; apical area sprinkled sparsely with whitish scales; a widely zigzag submarginal pale line; fringe dark with a series of white points at the terminations of the veins; secondaries rather paler; with a sinuous abbreviated apical submarginal litura; fringe as in primaries; wings below pale greyish-brown, sericeous; fringe as above; primaries with a costal pale yellow spot near apex, and from below this spot two short whitish squamose streaks; outer border rather narrowly whitish, bounded internally towards the apex by a series of subconfluent spots rather darker than the ground colour; secondaries with three curved parallel squamose whitish bands, the central one almost crossing the wing, the others very short; body below whity-brown: expanse 1 inch.

Rio Juruá, 7th November, 1874.

163. Ocha exigua, n. sp.

♂. Fuliginous brown, with the margins of the wings paler; primaries crossed by two parallel central elbowed lines, the interval between which is filled in with blackish-brown above the median vein; disc crossed by two parallel undulated brown lines; a submarginal series of black spots followed by a marginal series of brown spots; secondaries blackish at apex, crossed by a white apical litura; fringe at apex brown-tipped; wings below grey, with pale reddish-brown veins; body pale reddish-brown: expanse 21 millimetres.

♀. Altogether paler; the markings, excepting the blackish patch from the median to the subcostal vein between the central lines of primaries much less distinct: expanse 22 millimetres.

♀. Mabidiry, Rio Purus, 30th September, 1874; ♂. Boa vista, Rio Jutahi, 1st February, 1875.

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164. Ocha pallida, n. sp.

Primaries above pale gravel-red; a pinky-whitish sinuated transverse discal line, interrupted beyond the cell by a large (internally black-edged) ferruginous spot; fringe yellowish, spotted with ferruginous; secondaries stramineous; thorax reddish; abdomen pale stramineous, with dark brownish anus; under surface uniform pale stramineous: expanse 1 inch.

Ayrão, Rio Negro, 3rd July, 1874.

Genus ARTACE, *Walker*.

165. Artace albicans.

Artace albicans, Walker, Lep. Het. vi. p. 1492, n. 2 (1855).

Artace punctivena, Walker, l. c. n. 3 (1855).

Rio Tarumá, Rio Negro, 31st July, 1874.

166. Artace rivulosa, n. sp.

Wings semihyaline-white, veins spotted with black; primaries with a black basal spot, then two angular greyish-brown bands; next a broad central belt (interrupted at discoidal area, and only filled in between the median veins), then three pale brown parallel wavy discal stripes; and lastly, a pale brown external border; a marginal series of dark brown spots to all the wings; head white, brown behind; antennæ black; collar sordid white, brownish; prothorax white; tegulæ white; meso- and metathorax and abdomen brownish; under surface white, veins of the wings black towards the base, a marginal series of pale brown spots: expanse 1 inch 3 lines.

San Antonio, Rio Negro, 5th July, 1874.

This species is allied to *A. iridescens* (*Gastropacha iridescens* of Walker).

Tricypha, Moeschler, is closely allied to *Mœnoleneura* of this paper (p. 56).

EXPLANATION OF PLATE III.

Fig. 1. Mitradæmon velutinum, p. 60.
„ 2. Agylla mira, p. 58.
„ 3. Halesidota ænone, p. 50.
„ 4. Anthocroca cuneifera, p. 79.
„ 5. Anthocroca muscosa, p. 79.
Fig. 6. Edema pulchra, p. 64.
„ 7. Calledema sodalis, p. 66.
„ 8. Archylus nigrisparsus, p. 64.
„ 9. Prismoptera opalina, p. 78.
„ 10. Tifama exusta, p. 68.

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VI. Calopterygina *collected by* Mr. Buckley *in Ecuador and Bolivia.* By R. M'Lachlan, F.R.S., &c.

[Read February 6th, 1878.]

The *raison d'être* of this short paper consists in the recent acquisition by me of a small collection of dragonflies (and a few *Planipennia*) captured by Mr. Buckley at Intaj, in Ecuador, of which a large proportion are *Calopterygina*. On previous occasions I had received from him a few examples from the same Republic and from that of Bolivia, taken on former expeditions. The majority of the specimens proved to pertain to undescribed species, or to interesting varieties of already-known forms; hence it appeared to be of scientific value to incorporate a notice of the whole in a short memoir, as an incentive to him and to future travellers to pay more attention to these neglected insects. The discovery of the magnificent *Euthore mirabilis*, herein described, is in itself a proof of the richness of the Northern Andes, and another species (*Lais imperatrix*) is scarcely less important.

All the species are peculiarly characteristic of the regions whence they come, and thus neotropical in aspect.

Some of the species from Ecuador (received formerly) have already been described, or alluded to, by my friend and colleague Baron de Selys-Longchamps, in the "Troisièmes Additions au Synopsis des Caloptérygines," published in 1873; and as an acknowledgment, on my part, of the exactitude of his method of describing, I have adopted the same (with trifling modifications) in the present paper. The number of new species herein described is only six, and three of these add to the rapidly-increasing forms of the genus *Cora*, which could only claim one species in 1854, but of which eleven are now known.

Lais imperatrix, n. sp.

♀. Of large size. A true *pterostigma in the posterior wings*. Wings broad; postcostal area with three more or less complete rows of somewhat regular cellules.

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Wings hyaline, but having a slight reddish appearance in consequence of the reticulation being *wholly bright red*, excepting the entire marginal nervure, which is black. Pterostigma very small, slightly longer than broad (¾ mm. long), brown, between two blackish nervules in very mature individuals, slightly dilated on its lower edge. 32—34 antecubital nervules in the anterior wings.

Bright metallic green above and on the sides; labrum somewhat chalybeous, with a large yellow spot on either side, clothed with black hairs. Basal two joints of antennæ yellow. Sides of thorax with four narrow yellow lines, which become almost entirely filled in with black in very mature examples. Under side of thorax varied with black and yellow, the black predominating in very mature examples. Legs deep black, the coxæ spotted and encircled with yellow. Abdomen bronzy-green above to near the end of the fourth segment, then passing into black with a violet tinge; sides of first and second segments yellow (but becoming blackish with scarcely a trace of yellow in very mature examples).

Length of abdomen (♀), 48—50 mm. Length of posterior wing, 41—43 mm.; breadth, 9—10 mm. Expanse of wings, 87—90 mm.

Hab.—Intaj, Ecuador.

Four ♀, all tolerably mature, but one more so than the others.

This magnificent species is the largest of the genus, exceeding *L. globifera*, and with broader wings. It is peculiar in structure, especially in having a true pterostigma in the posterior wings (whereas in other species it is altogether wanting), and there is a thickened nervule and slight constriction of the median nervure at the point where it should occur in the anterior wings. At first I hesitated as to the place of this species (being acquainted with the ♀ only), and was strongly inclined either to locate it in *Hetærina*, or to form a new generic (or sub-generic) division for it. I believe, however, that it is really a *Lais* (and in this opinion am strengthened by that of Baron De Selys, to whom I communicated an example), but forming a special section, for no *Lais* hitherto known has any trace of a pterostigma in either pair of wings.

Euthore fasciata, Selys.

Two mature ♂ from Ecuador agree with a type from Venezuela excepting in unimportant particulars. The

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size is very slightly smaller (posterior wing 29 mm.). The opaque white portion of the wing less extended inwardly, and somewhat creamy; in one example the dark band is narrower, and in the anterior wing finishes about four cellules before the pterostigma, hence the hyaline apical portion is somewhat more extended.

Euthore mirabilis, n. sp.

Nodus somewhat nearer to the base than to the pterostigma, which is brown, much dilated and surmounts 9—13 cellules; 43—50 antecubital and 51—54 postcubital nervules in the anterior wings.

♂. Wings dilated in the middle; the base up to somewhat beyond the end of the quadrilateral, and the costal margin up to the nodus, smoky-hyaline; the apical border from beneath the pterostigma smoky-brown; *all the rest of the wing dark opaque orange-red* (*or vermilion*), the outer edge of this portion extremely oblique. Labrum with two large brownish-yellow spots, a spot on each cheek, and four between the eyes, of the same colour. Prothorax with two large spots, and the lateral margins, of the same colour. Thorax with six brownish-yellow lines on either side. Legs black; the femora brownish internally. Abdomen bronzy-black, paler towards the base; segments 1—4 with a brownish-yellow line on each side, and a vestige of the same on the fifth.

♀. Wings hyaline, tinged with smoky-brownish; in the anterior wings there is a *large* (nearly equilateral) *triangular opaque orange-red spot* placed so that the nodus is above the middle of its base (the costal margin remaining hyaline), externally with a narrow smoky line not touching its edge in very mature individuals; in the posterior wings there is a similar spot, but the colour is changed to reddish-brown, margined externally by smoky-brown; the other characters as in the ♂.

Length of abdomen: ♂, 38—42 mm.; ♀, 34—35 mm. Length of posterior wing: ♂, 28—32 mm.; ♀, 33 mm. Expanse: ♂, 62—68 mm.; ♀, 69—70 mm.

Hab.—Intaj, Ecuador, 6 ♂ and 6 ♀, all mature.

Although there are other *Odonata* that, through the presence of metallic colours, may rival this in beauty, there exists, so far as I know, none with the same deep opaque orange-red coloration.

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The reticulation of the wings is more dense than in other species of *Euthore*.

Thore.

Of this genus I have received from Ecuador a large number of examples of the *gigantea* group that are extremely puzzling. It is evident that much local variation exists, yet at the same time I do not think it possible to decide as to which are species or which only varieties, without strict local observations of their habits, for if it be found that the most striking forms occur together in the same locality, and yet keep separate *inter se*, that evidence will go far to prove we are dealing with species and not merely varieties.

Thore gigantea, Selys.

In three ♂ now in my collection the dark terminal portion of the wings commences at the nodus, but there is a somewhat triangular median internal prolongation towards the base, thus extending within the nodus.

Thore procera, Selys (race of *gigantea*, according to Selys).

In his "Troisièmes Additions," p. 34, De Selys enumerates several forms from Ecuador, obtained by me from a former collection made by Mr. Buckley. I have since received many additional examples. The forms are alluded to as Nos. 1 to 4, and I propose to make some remarks upon them consecutively.

No. 1.—The dark portion of the wings in the ♂, commencing at from ten to twelve cellules after the nodus in the examples seen by De Selys. In a longer series this form shows modifications, inasmuch as the dark portion varies in its point of commencement from the nodus itself to about twelve cellules after it. Among these there appear to me to be two forms, differing in size and apparent breadth of wing. In the larger the length of the posterior wings is from 40 to 45 mm., in the smaller from 35 to 38 mm., and the neuration in this smaller form appears to be less dense as regards the small intermediate supplementary sectors in the dark apical portion as seen in immature examples. The female varies considerably in the breadth of the dark band, and I am unable to apply the examples of this sex to the larger and smaller

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males. The best character whereby to separate *gigantea* and *procera* appears to be, that in the latter the inner edge of the dark portion of the wings of the ♂ is nearly regular, whereas in the former it is produced towards the base, but whether this will stand the test of minute application may be doubtful.

No. 2.—Only especially remarkable as a ♀ with the colours of the ♂ as in No. 1. Certainly nothing more than an abnormal and accidental condition.

No. 3 is the normal ♀.

No. 4—in which the dark portion of the wings commences midway between the nodus and the pterostigma—I am not able to re-examine.

Thore picta, Rambur (*Saundersii*, Selys, *olim*; *cf.* Appendice au "Troisièmes Additions," p. 65).

Two ♂ from Ecuador, of which one was formerly seen by De Selys, and referred doubtfully to this species. ("Troisièmes Additions," p. 36.) They are remarkable for their great size, and for the fact that in one the dark terminal portion of the wings is not preceded by a milky-white band; in the example above alluded to, the length of the posterior wing is 44 mm.; another, from the same locality (immature), is somewhat smaller (posterior wing 40 mm.), and shows indications of the white band.

Thore boliviana, n. sp.

♂. Distinct from described forms in the coloration of the wings. In the anterior wings the base is hyaline up to the end of the quadrilateral, and also on the costal margin to the nodus, but the wing up to midway between the nodus and pterostigma is opaque ochreous-yellow, excepting the costal margin (as far as the principal sector), which becomes somewhat milky; the rest of the wing brownish-black, with brilliant purple and green reflections, the inner edge of this dark portion slightly concave. The posterior wings similarly coloured, only that the ochreous part is suffused with smoky-brown, but leaving a not well-defined paler band, of which the inner edge commences at the nodus and is continued in a very oblique manner, the outer edge formed by the inner edge of the dark apical portion, hence the band is cuneate, broad on the costa, and reduced to a point on the inner margin: about fifty antecubital nervules in the anterior wings.

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Legs black; the inner side of the femora greyish or whitish, excepting at the tips.

Length of abdomen, 42 mm. Length of posterior wing, 36 mm. Expanse of wings, 77 mm.

Chairo, Bolivia. One mature ♂.

Apparently intermediate between *T. picta* and *T. Batesi:* remarkable for the wings being nearly entirely opaque ochreous before the dark apical portion.

Thore æquatorialis, Selys (race? of *albovittata* according to De Selys).

Since the type was described I have received three other examples from Intaj (all females), that appear to belong here. All are rather larger (posterior wing 40 mm.). One is mature, without a vestige of the milky band; the others immature, as indicated by the pterostigma, which is pale brown. In these immature examples the milky band is clearly visible, especially on the posterior wings, and is margined externally by smoky greyish-brown; its position and direction as in the type of *æquatorialis* and not as in *albovittata*. The pterostigma surmounts from six to nine cellules. The ♂ of this species (or race) is still a *desideratum*.

Cora dualis, n. sp.

Wings rather broad; nodus placed much nearer to the base of the wing than to the origin of the pterostigma, which is dark brown, short (2½ mm. long), very thick, surmounting 4—5 cellules; 32—35 antecubital and 45—47 postcubital nervules in the anterior wings; 4—5 sectors interposed between the first and second sector of the triangle; the second of the triangle longly and regularly trifurcate.

♂. Wings hyaline, the posterior margin faintly tinged with yellowish, with the appearance of a *whitish spot on the anterior margin just beyond the nodus*, caused by the neuration at that point being milky white, instead of black like all the rest. Labrum and cheeks brownish-yellow; nasus with a brownish-yellow spot on either side; upperside of head with four brown spots (in two rows) anteriorly, and the posterior margin with a narrow brown continuous line; basal two joints of antennæ yellowish above. Prothorax with two very large lateral spots, and a small median, brownish-yellow; its lateral margins

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yellow. Thorax bluish (yellowish in some examples), with five broad black lines on either side of the central carina. Legs black; femora yellowish internally, excepting at the tips. Abdomen black, the basal four segments bronzy; first segment with a large yellow spot on either side, second with a broad lateral line, third and fourth with a yellow lateral spot at the anterior end (occasionally visible as a point on the fifth), followed by a narrow line, not extending to the posterior margin. The tenth segment with a very prominent median tubercle.

♀. Wings tinged with yellowish all over; no whitish spot; pterostigma pale brown; markings of the head and prothorax as in the ♂. Thorax black, with five broad golden-yellow lines on either side. Abdomen marked as in the ♂, and with a large yellow spot (sometimes indistinct) on either side of the ninth segment.

Length of abdomen, ♂ 45—47 mm., ♀ 39 mm. Length of posterior wing, ♂ 37—39 mm., ♀ 37 mm. Expanse of wings, ♂ 81—85 mm., ♀ 83 mm.

Hab.—Intaj, Ecuador, 3 ♂ and 2 ♀.

This very large and distinct species appears to me to combine the characters of *Cora* and *Thore*, differing from others of the genus *Cora* in (apart from its large size) the more shortly-petiolated wings, the position of the nodus, the greater number of interposed supplementary sectors, the more strongly-curved ends of the sectors, &c.; and the whitish spot beyond the nodus in the ♂ may be taken as representing the milky band so common in *Thore*. Also, it should be remarked, that the wings of *T. beata* are not much more dilated than those of *C. dualis*.

Considering the existence of such species as *C. dualis*, *C. modesta*, *C. munda*, *C. terminalis*, all more or less approaching *Thore*, it might be advisable to change the sequence of the subdivisions of the "Légion" *Thore* from that of *Chalcopteryx*, *Thore*, *Euthore*, *Cora*, to *Chalcopteryx*, *Euthore*, *Thore*, *Cora*.

Cora munda, n. sp.

Nodus placed slightly nearer to the base of the wing than to the origin of the pterostigma, which is brown (brownish-ochreous in somewhat immature individuals), short (2½ mm. long) and very thick, surmounting about 4 cellules; 29—33 antecubital, and 29—31 postcubital nervules in the anterior wings; 2—3 sectors interposed

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between the first and second sectors of the triangle; the second of the triangle longly and regularly trifurcate.

♀. Wings hyaline, universally tinged with yellowish, which is more pronounced, and somewhat greenish on the anterior margin.

Nasus, labrum and cheeks piceous (yellowish or brownish in somewhat immature examples). Basal two joints of antennæ yellowish. Top of the head black with a large fulvous spot on either side anteriorly, connected with a similar one on either side of the vesicle; posterior margin with a continuous fulvous line dilated at either end. Prothorax varied with fulvous and black. Thorax brownish (golden-brown in immature examples), with black lines, none of which are very distinct excepting that placed on either side of the black dorsal carina. Legs black; femora brown internally, almost up to the tips. Abdomen bronzy-black with chalybeous and violet reflections; first and second segments almost entirely yellowish, the second black in the middle above; third to sixth with a yellow ring at the anterior end, sometimes almost interrupted above by a prolongation of the black ground; a yellow lateral line on the third and fourth segments in the mature insect, extending to the fifth in immature examples; an indication of a yellow spot on either side of the eighth and ninth segments.

Length of abdomen, 34—37 mm. Length of posterior wing, 32—34½ mm. Expanse of wings, 70—73 mm.

Hab.—Intaj, Ecuador, 3 ♀.

Apparently allied to *C. dualis*, but smaller, and with the colours somewhat different; the wings more strongly tinged, the neuration less complicated, the nodus nearer to the origin of the pterostigma (hence the number of antecubital and postcubital nervules is nearly equal). Through *C. dualis* it forms a good example of the gradual transition from *Thore* to *Cora*.

Cora terminalis, n. sp.

Nodus placed midway between the base of the wing and the origin of the pterostigma, which is dark brown (paler in the ♀), thick, 3 mm. long, its inner edge very oblique, surmounting 5 cellules; 34—37 antecubital and 29—33 postcubital nervules, in the anterior wings. Two sectors interposed between the first and second sectors of

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the triangle, the second of the triangle longly and regularly trifurcate.

♂. Wings hyaline, anterior margin slightly tinged with greenish-yellow; *the apex* (from about the middle of the pterostigma) *brown*, slightly areolated with paler (in the posterior wings this brown portion forms only a rather large spot under the pterostigma).

Nasus, labrum, cheeks and orbits livid (possibly bluish in life); head otherwise black, with four bluish-grey spots between the eyes, two anteriorly and two posteriorly. Prothorax with two large brown spots. Thorax yellowish on the sides, varied with black (or, more properly, black with yellow lines), above black, the ante-humeral and humeral lines greenish, enclosing a black oval between them. Legs black; the base of the femora brown interiorly. Abdomen black; first segment broadly yellow on the sides; second with rather broad lateral lines; third with a yellow spot anteriorly followed by a very narrow lateral line; fourth with a similar spot, but with no line. Appendages distinctly denticulate externally.

♀. Wings entirely hyaline, very slightly tinged with yellowish; the anterior margin more distinctly greenish-yellow. Front nearly entirely piceous; the cheeks and orbits livid; prothorax with a brown spot on either side, and margined with brown. Thorax more distinctly yellowish, with black lines, the yellow predominating. Base of abdomen as in the ♂ (mutilated after the third segment).

Length of abdomen, ♂, 40 mm., ♀ ? Length of posterior wing, ♂, 35 mm.; ♀, 34 mm. Expanse of wings, ♂, 77 mm.; ♀, 76 mm.

Hab.—Unduavi, Bolivia, 1 ♂ and 1 ♀.

The ♂ is very distinct from all described species in consequence of the brown apex of the wings; the ♀ readily separable from that of *C. modesta* (with which it agrees in the position of the nodus) by its much larger size, different coloration of thorax, &c.

Cora inca, Selys.

One ♀ from Ecuador, thus referred by De Selys ("Troisièmes Additions," p. 40).

N.B.—It scarcely agrees with the description of the ♂ (from Quito), because the nodus appears to me to be

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placed almost precisely midway between the base of the wing and the *origin* (not the *end*) of the pterostigma.

Note.—The following two species have been recorded from Ecuador and Bolivia respectively, but are not among those collected by Mr. Buckley:—

Hetærina carnifex, Hagen.

Quito, Ecuador. Selys "Troisièmes Additions," p. 15.

Thore Victoria, M'Lachlan.

Bolivia. M'Lach. Ent. Month. Mag. vol. vi. p. 28; Selys "Secondes Additions," p. 25, ♂; *id.* "Troisièmes Additions," p. 33, ♀?

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VII. *On the different forms occurring in the Coleopterous family* Lycidæ, *with descriptions of new genera and species.* By CHAS. O. WATERHOUSE.

[Read February 6th, 1878.]

I HAVE for a considerable time devoted my attention to the difficult Coleopterous genus *Lycus* and its allies, and have already published two papers on this family.* I have been much hindered in pursuing the study of this group by the great difficulty of determining the genera. My attention has been especially directed to the Asiatic species; and with a view to determining the genera to which the species should be referred I have selected a series of forms, which I here characterize, but seldom venture to name as genera, as I think it extremely doubtful whether they could be maintained as such. I have examined the various parts, as the palpi, antennæ, rostrum, thorax, scutellum, elytra, &c. of all the different forms, but find no definite characters upon which to establish genera. It is evident that the genera (if made) must be characterized by the combinations presented by these parts, and in the following account I have done this.

I have divided the family into forty-five groups (or genera), but, doubtless, numerous others would have to be made, especially among the American species. The geographical distribution of the species is apparently very peculiar. For instance, the genus *Calopteron* is peculiar to South America, but there are two species—one from the Celebes and another from New Hebrides—which only differ in the form of the palpi from those from South America; but as these organs vary immensely, it is scarcely safe to establish genera for their reception. Again, the only species which agrees generically with our

* "Monograph of the Australian species of the Coleopterous family *Lycidæ*." Trans. Ent. Soc., June, 1877, p. 73.
"Monograph of the Coleopterous genus *Calochromus* of the family *Lycidæ*." Cistula Entomologica, June, 1877, p. 195.

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British *Pyropterus affinis* is a species from Borneo, which I here describe as *P. sculpturatus*.

The following is my account of the genera so far as they are known to me.

I am not acquainted with the following genera:—*Celiasis*, Cast., *Cladocerus*, Kirsch, *Micronychus*, Motsch.

Dictyoptera, Latr., 1829, has been applied to various species, but it is better to omit it altogether, as the name is preoccupied in *Orthoptera* by Leach, 1818.

Digrapha is synonymous with *Calopteron*.

Anarhyncus, Guérin, 1838; no species is given, but the first species described under this genus is *Anarhynchus scutellaris*, Er., and this is a *Calochromus* (1833).

Coptorhinus, *Temnostoma* and *Odontocerus*, given by Guérin (Voy. Coq. p. 72, 1838), have no species assigned to them, and as the names are all preoccupied in other orders it is best to drop them altogether.

Section I.—Claws dentate.

Genus 1. MACROLYCUS, gen. nov.

Antennæ compressed, dentate. Rostrum none; apical joint of maxillary palpi large, triangular. Claws with a sharp tooth at the apex, scarcely visible in the ♂.

Type, *M. coccineus*, sp. n.

Section II.—Claws simple.

Genus 1. CALOCHROMUS, Guérin, Ann. Fr. 1833, p. 158.

Rostrum none. Thorax with a mesial impressed line, and with a more or less distinct fold or carina, commencing near the posterior angle and directed obliquely forwards. Elytra pubescent, with several longitudinal folds, but with no distinct carinæ. Legs simple.

Type, *C. glaucopterus*, Guérin.

Genus 2.

Same as *Calochromus*, but with the intermediate coxæ dentate, the intermediate femora thickened and with a tooth beneath, the tibiæ of the same pair of legs and the posterior tibiæ curved.

Type, *C. tibialis*, Waterh.

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Genus 3. LYGISTOPTERUS, Muls., Ann. Soc. Agr. Lyon, 1838, p. 79.

Characters of *Calochromus*, but with a distinct (but short) rostrum.

Type, *L. sanguineus*, Linn.

Genus 4.

Antennæ short, compact, dentate, compressed, of equal width throughout, 3rd joint a trifle longer than broad, 4th to 10th joints transverse. Rostrum distinct, but short. Thorax rather transverse, quadrangular, disk smooth, margins reflexed. Elytra flattened, subparallel, with indistinct costæ, the intervals punctured.

Hab.—Africa.

Type, *Lycus scrobicollis*, Fåhr.

Genus 5.

Rostrum long. Antennæ long, not compressed, joints 7—10 with internal angle rather prominent. Thorax with a longitudinal mesial impression, and a ridge on each side as in *Calochromus*. Elytra with four fine costæ. Anterior tibiæ with an acute tooth at the internal apical angle.

Hab.—S. America.

Type, *Lycus Lacordairei*, Kirsch.

Note.—I have determined this species from description, but I have little doubt as to the identity. *L. succinctus*, Latr., should also belong to this group.

Genus 6. LYCUS, Fabr. Mant. Ins. I. 1787, p. 163.

Rostrum long. Antennæ compressed and dentate, the 3rd joint as long as the two following taken together. Thorax smooth on the disk, the sides expanded and reflexed. Elytra ample, expanded (more or less) posteriorly.

1. *Lycus*, Fabr. African species.
2. *Lycostomus*, Mots. Asiatic species.
3. . . American species.

Genus 7. CALOPTERON ?

Rostrum none. Maxillary palpi short and small, apical joint small, trapeziform. Antennæ long, compressed.

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Thorax with a complete mesial carina. Elytra with four costæ, the interstices with transverse nervures.

Hab.—New Hebrides.

Type, *C. notatus*, sp. n.

Genus 8. CALOPTERON?

Rostrum none. Apical joint of palpi very large, long, knife-shaped. Antennæ very compressed, simple. Thorax with an interrupted mesial carina. Elytra very ample, quadricostate, the interstices with transverse nervures.

Type, *C. Pfeifferi*, sp. n.

Genus 9.

Rostrum very short. Eyes prominent. Antennæ long, slender, very compressed, the basal joint large, pear-shaped. Thorax with a mesial carina in front, continued posteriorly by a mesial channel. Each elytron with three strong costæ, the third forming a ridge over the shoulder. Legs very long and slender, the femora scarcely compressed.

Type, *Lycus bicolor*, Linn.

Genus 10. CALOPTERON, Guérin, Voy. Coq. 1836, p. 72.

Thorax with complete mesial carina. Antennæ long, compressed, generally broadest just before the apex, not pectinate. Apical joint of maxillary palpi large, transversely trapeziform. Elytra with four costæ, the interstices with numerous transverse nervures.

Hab.—America.

Type, *C. apicalis*, Guérin.

See note after Genus 14.

Genus 11. CÆNIA, Newman, Ent. Mag. v. 1838, p. 381.

Thorax with complete mesial carina. Antennæ pectinate. Apical joint of maxillary palpi moderately large, acuminate at its apex. Elytra with nine carinæ, the interstices with numerous transverse nervures.

Hab.—America.

Type, *C. scapularis*, Newman.

Genus 12. CELETES, Newman, Ent. Mag. v. 1838, p. 381.

Thorax with complete mesial carina. Antennæ pectinate, the branches springing from the base of each joint.

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Apical joint of maxillary palpi small, acuminate at the apex. Elytra with four carinæ, the interstices with transverse nervures.

Type, *C. basalis*, Leconte.

Genus 13. EMPLECTUS, Er., Wiegm., Arch., 1847, p. 82.

Rostrum none. Apical joint of maxillary palpi narrowed at the apex. Antennæ compressed, simple. Thorax with a mesial carina divided in the middle into two.

Hab.—America.

Type, *E. bimaculatus*, Er.

Genus 14.

Rostrum none. Apical joint of maxillary palpi elongate securiform. Antennæ long, each joint with a long lamellate branch springing from its apex. Thorax with a mesial carina, which is double in the middle. Elytra with nine costæ (only four distinct), the interstices with a row of punctures.

Type, *C. tristis*, sp. n.

Calopteron sinuatus, Kirsch., is evidently allied to this.

Note.—Besides the above American forms, there are numerous others usually placed with *Calopteron* and *Emplectus*, but which differ so much from each other, and from both these genera that they should be separated. See Kirsch. in Berl. Ent. Zeit. 1865, ix. p. 54, where a very good table is given.

Genus 15. LYPONIA, gen. n.

Rostrum none. Teguments thin. Antennæ with long stout branches to the joints. Thorax subquadrate, with a mesial impressed line on the disk. Elytra with nine costæ, the alternate ones more pronounced, the first, second and third not reaching the apex, the fifth and seventh joining the sixth some distance from the apex, the interstices with transverse nervures.

Type, *L. debilis*, sp. n.

Genus 16.

Rostrum none. Antennæ very slender, simple. Apical joint of maxillary palpi subquadrate, oblique at the apex. Thorax shining, even, with only a slight longitudinal

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mesial impression behind. Elytra with nine equal costæ, the interstices narrow with a single line of punctures. Scarcely pubescent.

Hab.—Asia.

Type, *L. gracilis*, sp. n.

Genus 17.

Rostrum none. Antennæ of ♂ with slender pubescent branch emitted from each joint. Thorax even, with a very slight longitudinal impression behind. Elytra pubescent, with nine nearly equal costæ, the interstices with a single line of punctures.

Hab.—Asia.

Type, *L. punctipennis*, sp. n.

Genus 18.

Note.—Several N. American species of so-called *Eros* should follow here, *e. g.*, *E. lictor*, N., *E. alatus*, Newm., &c.; they are like Genus 17, but have simple antennæ.

Genus 19.

Rostrum none. Antennæ serrate. Thorax even, with a mesial longitudinal impression behind. Elytra with nine costæ, the alternate ones more elevated. Thorax and elytra pubescent.

Type, *L. alternans*, sp. n.

Genus 20.

Rostrum none. Antennæ broad, serrate. Thorax broad, a little more than a semicircle, with a discoidal lanceolate areolet, from the lateral angles of which proceeds an oblique carina which is scarcely noticeable. Scutellum quadrate, truncate at the apex. Elytra with nine regular nearly equal costæ, the interstices with a single line of punctures. Legs rather short. Thorax, elytra and legs having a woolly appearance.

Type, *L. deplanata*, sp. n.

Genus 21.

Rostrum none. Antennæ broad, dentate. Thorax rather narrowed in front, the posterior angles acute, with a very distinct discoidal areolet. Elytra with four distinct costæ, the interstices with two lines of punctures divided by a very fine costa.

Type, *L. obsoletus*, sp. n.

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Genus 22.

Rostrum none. Antennæ not very long, joints 3—10, with a long compressed branch proceeding from the base of each. Thorax with seven areolets. Elytra as in Genus 21.

Type, *L. excellens*, sp. n.

Genus 23. EROS, Newman, Ent. Mag. v. 1838, p. 382.

Rostrum none. Antennæ simple. Thorax with five areolets. Elytra quadricostate, the interstices with two lines of foveolæ, the lines divided by a fine costa.

Type, *E. humeralis*, Fabr.; *E. aurora*, Fabr.

Genus 24. PLATYCIS, Thomson, Scand. Col. v. 1863, p. 162.

Rostrum none. Antennæ slender and simple. Forehead produced between the bases of the antennæ. Thorax subquadrate, with seven not well-defined areolets. Elytra nearly as in *Eros*.

Type, *P. minutus*, Fabr.

Genus 25.

Rostrum none. Antennæ dentate. Thorax, five areolets, two small anterior, one mesial posterior lanceolate, and one large one occupying each side. Elytra with four strong costæ, the interstices with regular distinct transverse costæ.

Type, *L. costifer*, Walker.

Genus 26. METRIORHYNCHUS, Guérin, Voy. Coq. 1838, p. 72.

Antennæ dentate. Rostrum variable. Thorax with seven areolets. Elytra with nine parallel costæ, the intermediate ones for the most part less elevated, and in some cases almost disappearing.

Type, *M. parallelus*, Guérin.

Genus 27.

Rostrum none. Antennæ dentate. Thorax with five distinct areolets. Elytra with four costæ, the interstices irregularly punctured.

Type, *M. clientulus*, C. Waterh.

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Genus 28.

Rostrum none. Antennæ dentate. Thorax with five distinct areolets. Elytra with four costæ, the interstices with a line of obscure punctures on each side.

Type, *M. velutinus*, sp. n.

Genus 29.

Rostrum none. Antennæ dentate. Thorax rather broad, with blunt posterior angles, with a mesial lanceolate areolet. Elytra parallel, with four costæ, the interstices with two lines of punctures, the lines divided by a very fine costa.

Type, *M. dichrous*, C. Waterh.

Genus 30.

Rostrum none. Antennæ dentate. Thorax small, with five areolets. Elytra rather narrow at the base, gradually enlarged posteriorly, with four costæ, the intervals with rugose punctuation.

Type, *M. limbatus*, C. Waterh.

Genus 31.

Rostrum none. Antennæ dentate. Thorax triangularly produced over the head, with a mesial longitudinal carina in front, posterior angles acute. Elytra with four costæ, the intervals with two lines of regular quadrate punctures, the lines divided by a fine costa.

Type, *Dict. angulata*, Klug.

Genus 32. TAPHES, gen. n.

Insect rather short, having a velvety appearance. Antennæ scarcely dentate, beset with long fine hairs in the male. Thorax small, transverse, with a large lozenge-shaped discoidal areolet, its angles nearly reaching the margins. Elytra rather enlarged posteriorly, quadricostate, the interstices with two lines of punctures (the lines scarcely divided by any costa).

Type, *T. brevicollis*, sp. n.

Genus 33. PYROPTERUS, Muls., Ann. Soc. Agr. Lyon, i. 1838, p. 81.

Antennæ simple, the 2nd and 3rd joints small, nearly equal. Thorax with five areolets. Elytra with four

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costæ, the interstices with very numerous, rather regular transverse costæ.

Type, *P. affinis*, Payk.

Note.—The only species known to me which agrees with this is *P. sculpturatus*, mihi, from Borneo.

Genus 34. CLADOPHORUS, Guérin, Voy. Coq. 1838, p. 72.

Forehead gibbous, the antennal joints (3—10) furnished with a more or less long branch. Thorax with seven areolets. Elytra long, parallel, with four costæ, the interstices with two lines of punctures, the lines divided by a fine costa.

Type, *C. formosus*, Guérin.

1. Costæ of elytra parallel .. .. *C. formosus*, Guérin.
2. Costæ diverging at the base .. *C. restrictus*, sp. n.

Genus 35.

Antennæ long, somewhat dentate. Thorax narrow, with seven areolets, the two lateral ones imperfectly divided, posterior angles acute, prominent. Scutellum somewhat rounded, with a small notch at the apex. Elytra with seven costæ, the first trifurcate at its base, interstices with a single line of punctures. Legs very long, compressed.

Type, *L. luteolus*, sp. n.

Genus 36. TRICHALUS, Waterh., Tr. Ent. Soc. 1877, p. 82.

Like Genus 35, but thorax with a discoidal lanceolate areolet only.

Type, *T. flavopictus*, C. Waterh.

Genus 37.

Eyes very large. Antennæ long, with the joints (3—10) each with a long, compressed branch arising from the base of each joint. Thorax pubescent, with seven shallow impressions. Elytra pubescent, with four parallel costæ, the interstices each with a line of obscure punctures on each side.

Type, *L. dispar*, sp. n.

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Genus 38.

Eyes large; forehead with a longitudinal impressed line. Antennæ long, dentate (♀?). Thorax with no areolets, rugulose on the front margin, with a smooth mesial anterior line. Elytra very slightly narrowed towards the apex (where they do not meet at the suture), with three costæ, the first abbreviated posteriorly, the intervals flat, pubescent.

Type, *L. exilis*, sp. n.

Genus 39. ATELIUS, gen. n.

Downy. Head prominent, forehead protuberant, eyes small, antennæ longer than the whole insect, very compressed, the joints 3—10 triangular. Thorax small, margins incrassate, with a complete mesial longitudinal carina. Elytra parallel, each with four costæ, the interstices with two lines of punctures which are generally confluent transversely.

Type, *A. expansicornis*, Walker.

Genus 40. SCARELUS, gen. n.

Head as in 39. Antennæ much longer than the whole insect, nearly filiform or slightly compressed. Thorax trapezoidal, small, with a complete mesial carina. Elytra parallel, with three costæ, the interstices with very numerous transverse impressions.

Type, *S. longicornis*, sp. n.

Genus 41. LIBNETUS, gen. n.

Pubescent. Head small; antennæ rather short, simple, thicker about the middle, narrowed to the apex. Thorax small, trapeziform, margins elevated, no mesial raised line. Elytra woolly, subparallel, with four costæ, the intervals obscurely and finely punctured.

Type, *L. pumilio*, sp. n.

Genus 42. LYROPÆUS, gen. n.

Pubescent, woolly. Antennæ linear, compact, slightly compressed, the joints slightly emarginate at the apex. Thorax trapeziform, margins broadly reflexed, with a slight indication of a mesial elevated line. Elytra narrow

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at the base, much enlarged posteriorly, with four scarcely noticeable raised lines; the surface woolly, extremely finely punctured.

Type, *L. fallax*, Walker.

Genus 43. DEXORIS, gen. n.

Head nearly as in the preceding. Antennæ woolly, thickest at the base, gradually tapering to the apex. Thorax trapezoidal, with a carina on each side, extending from the anterior angle to the middle of the posterior margin where the two carinæ nearly meet. Elytra flat, pubescent, parallel, with no costæ; the surface thickly studded with minute obtuse tubercles.

Type, *D. insignis*, sp. n.

Genus 44. HOMALISUS, Geoff., Hist. Ins. Paris, i. 1762, p. 179.

Head rather prominent. Antennæ rather short, simple, the 2nd and 3rd joints small, subequal. Thorax with a carina on each side near the margin. Elytra parallel, with 10 lines of punctures, the intervals very narrow, subcostiform.

Type, *H. suturalis*, Vill.

The following are the new species referred to in the foregoing portion of this paper:—

Macrolycus Bowringii, sp. n.

Niger, opacus; thorace coccineo, lateribus reflexis, angulis posticis acutis; scutello nigro; elytris basi thorace haud latioribus, postice gradatim ampliatis, coccineis, quadricostatis, costis parum elevatis, interstitiis subtiliter punctulatis.

Long. 10 lin.

Antennæ $\frac{3}{4}$ the length of the elytra, compressed, rather broad, strongly dentate. Thorax a little broader than long, in the middle in front rather angular, constricted a little behind the middle, the posterior angles diverging and acute; the anterior and lateral margins broadly reflexed, with a short mesial carina in front, and a carina on each side at the constriction; disk with a longitudinal mesial impression. Scutellum narrowed towards the apex. Elytra long, much enlarged posteriorly, each with four

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costæ, the interstices finely and thickly punctured and with indications of reticulation here and there.

Hab.—Allahabad (J. C. Bowring, Esq.). Brit. Mus.

This species differs from all the species of this family in having the claws split at the apex.

Genus 7. *Calopteron? notatus*, sp. n.

Flavo-testaceus; antennis apicem versus, elytris maculis 6 apiceque, et tarsis nigrescentibus; thorace antice angustato, medio carinato, angulis posticis acutis; elytris basi thorace haud latioribus, apicem versus sat ampliatis quadricostatis.

Long. 4½ lin.

Hab.—New Hebrides (J. C. Bowring, Esq.). Brit. Mus.

Genus 8. *Calopteron? Pfeifferi*, sp. n.

Sordide flavus; thorace parvo, antice angustato, haud areato, carinâ longitudinali medianâ medio interruptâ; elytris valde inflatis, convexis, cyaneis, nitidis, reticulatis.

Long. 4⅓ lin., lat. elytr. 3¼ lin.

Head small, semicircularly impressed above. Antennæ long, subparallel, compressed, fuscous, except the basal and two apical joints, which are yellowish. Thorax narrowed in front, the sides nearly straight, posterior angles acute, the mesial dorsal carina is not very distinct, and is interrupted in the middle. Scutellum yellowish, acuminate at the apex. Elytra very convex, nearly as broad as long, rounded at the sides, glassy, steel-blue, the extreme base yellowish; each elytron with four well-marked costæ, the intervals with regular transverse costæ dividing the whole elytra into quadrangles. Tibiæ a little fuscous.

Hab.—Celebes (Wallace). Brit. Mus.

Genus 14. *tristis*, sp. n.

Niger, depressus, opacus; antennis flabellatis articulis 2 apicalibus flavis; thorace flavo medio longitudinaliter late nigro, antice rotundato, angulis posticis acutis; elytris fere parallelis, flavis, suturâ usque ad medium apiceque nigris, quadricostatis, interstitiis biseriatim punctatis.

Long. 5 lin.

Dull black, the base of the palpi and base of the legs testaceous. Antennæ long, flabellate, the two apical

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joints yellow. Thorax a little broader than long, entirely rounded in front, scarcely sinuate at the sides, yellow, with a mesial black stripe, the margins finely reflexed, the posterior angles slightly directed outwards, acute, disk with a mesial carina, which divides and encloses an elongate narrow areolet in the middle, and then again becomes a single carina just before the posterior margin. Elytra subparallel, a little wider towards the apex, yellow, with a sutural stripe extending a little beyond the middle, and the apex black; each elytron with nine costæ, the 2nd, 4th, 6th and 8th only distinct, the 4th and 8th the strongest, the punctures in the intervals are close and rather strong.

Hab.—Cuença, Ecuador. Brit. Mus.

Genus 15. *Lyponia debilis*, sp. n.

Rubro-fuscus; thorace limbo elytrisque rufis; antennis fere nigris; thorace æquali, marginibus parum reflexis, disco lineâ longitudinali impresso; scutello piceo; elytris postice perparum empliatis, quadricostatis, interstitiis, biseriatim fortiter punctatis, punctis transversis, seriebus a costis tenuibus divisis.

Long. $4\frac{2}{3}$ lin.

Thorax rather flat on the disc, with a mesial fine impressed line (not extending to the anterior nor posterior margins), the sides gently reflexed. Scutellum pitchy, truncate at the apex. Elytra with the 4th, 6th and 8th costæ reaching to the apex, the 4th turns towards the suture a little before the apex, by which means the 1st, 2nd and 3rd are somewhat abbreviated; the 5th and 7th costæ join the 6th some distance before the apex, the 9th is only visible at the shoulder when viewed laterally; the interstices have each a row of strong transverse punctures.

The tegument of the elytra is unusually delicate and somewhat transparent.

Hab.—China (J. C. Bowring, Esq.). Brit. Mus.

Genus 16. *gracilis*, sp. n.

Niger, nitidus, parallelus, depressus; thorace nitido lævi; elytris flavis, striato-punctatis, interstitiis angustis, costiformibus; tarsis piceis.

Long. 3 lin.

Antennæ about as long as the elytra, subfiliform; the 2nd joint distinct. Thorax slightly transverse, rounded in

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front, smooth and shining above, the posterior angles a little prominent, acute. Scutellum truncate at the apex. Elytra parallel, yellowish, each with ten lines of rather strong punctures, the intervals very narrow, subcostiform.

Hab.—S. India (M. J. Walhouse, Esq.). Brit. Mus.

Genus 17. *punctipennis*, sp. n.

Nigro-piceus, supra subtiliter pubescens; fronte flavâ; thorace scutelloque flavo; elytris parallelis, flavis sat fortiter crebre striato-punctatis, interstitiis angustissimis, alternis parum magis elevatis; ore coxisque testaceis.

Long. 3¾ lin.

Antennæ scarcely as long as the elytra, with long fine pubescence, 3rd to 10th joints emitting a long slender branch. Thorax obscure yellow, a little angular in front, straight at the sides, the posterior angles a little projecting and acute, above slightly shining, impressed on each side, and with a short impressed mesial line behind. Scutellum truncate at the apex. Elytra parallel, obscure yellow, each with ten lines of closely-set rather strong punctures, the intervals very narrow, the 2nd, 4th, 6th and 8th costiform near the base.

Hab.—Java (J. C. Bowring, Esq.). Brit. Mus.

Genus 19. *alternans*, sp. n.

Ater; antennis sat latis, dentatis; thorace antice omnino rotundato, medio postice longitudinaliter impresso, angulis posticis acutiusculis; elytris dimidio basali ferrugineo, nono-costatis, costis alternatis minus elevatis, interstitiis uniseriatim punctatis.

Long. 4½ lin.

Thorax deeply impressed within the margins, which are thickened; behind the middle there is a longitudinal distinct impression. The elytra are subparallel, thickly pubescent, the basal half ferruginous; each elytron has nine costæ, the alternate ones a little less elevated, the interstices have a single row of punctures, which are much obscured by the pubescence.

Hab.—Sarawak (Wallace). Brit. Mus.

Genus 19. *misellus*, sp. n.

Niger, pubescens; thorace, scutello, elytrisque rufis; antennis articulo apicali ferrugineo; thorace medio longi-

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tudinaliter canaliculato; elytris nono-costatis, costis alternatis minus elevatis, interstitiis uniseriatim punctatis.

Long. 3 lin.

Thorax with the margins incrassate, but not much reflexed; there is a shallow impression on each side within the margin, extending also along the base, but not quite reaching the middle; in the middle there is a clear narrow channel, which does not quite extend to the front margin. Each elytron has nine costæ, the alternate ones finer and less elevated, the interstices have a single line of distinct punctures.

Hab.—Penang (J. C. Bowring, Esq.). Brit. Mus.

Genus 20. *deplanatus*, sp. n.

Ater, depressus, brevissime pubescens; antennis crassis, flavis; thorace fere semicirculari, supra antice ruguloso, medio areolâ lanceolatâ instructo; elytris parallelis, flavis, apice nigro, nono-costatis, interstitiis regulariter uniseriatim punctatis; pedibus sat brevibus, fuscis, tibiarum basi et apice unguiculisque flavis.

Long. 4 lin.

Rather a broad, short species. Antennæ yellow (except the fuscous basal joint), not very long, very broad, dentate. Thorax nearly semicircular, bisinuate at the base; the mesial lanceolate areola is narrow, and from the middle of each side of it there is an indication of a raised line which does not quite reach the side of the thorax. The elytra are nearly parallel, yellow, with apical third black; each elytron has nine nearly equal costæ (the alternate ones a trifle more distinct), and the interstices have a single row of distinct punctures. Legs pitchy, the extreme apex of the femora, the base and apex of the tibiæ, and the claw joint of the tarsi yellowish.

Hab.—New Guinea, Dory (Wallace). Brit. Mus.

Genus 21. *obsoletus*, sp. n.

Fuscus; thorace medio areolâ lanceolatâ, angulis posticis acutis; elytris dimidio basali pallide fusco, apice fere nigro, quadricostatis, interstitiis biseriatim evidenter punctatis, seriebus a costâ tenui divisis.

Long. 4¼ lin.

Thorax with anterior margin and the sides finely punctured, the sides reflexed, disk with a well-defined

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lanceolate areola, posterior angles acute. Elytra with the basal half pale fuscous; each elytron with four distinct costæ, the interstices with two lines of distinct black punctures, the lines separated by a fine costa.

Hab.—Java (J. C. Bowring, Esq.). Brit. Mus.

Genus 22. *excellens*, sp. n.

Ater, opacus; antennis flabellatis; thorace vix 7-areolato; elytris dimidio basali pallide fusco, quadri-costatis, interstitiis biseriatim evidenter punctatis, punctis nigris.

Long. 3½ lin.

Thorax with the margins scarcely reflexed; the surface is divided into seven areolets, but the mesial lanceolate one only is very distinct, the lines dividing the others are rather obsolete, and the lateral ones are scarcely noticeable. The elytra have each four distinct costæ, and the interstices have two lines of black punctures, the lines of punctures are not divided by any distinct costa.

Hab.—Sarawak (Wallace). Brit. Mus.

Genus 28. *velutinus*, sp. n.

Ater; thorace, scutello, elytrisque læte rufis, velutinis; thorace quinque areato, areolâ medianâ nigrâ; elytris obsolete quadri-costatis.

Long. 4 lin.

Elongate, narrowed in front; antennæ rather long. Thorax with the margins incrassate, the five areolets well defined; elytra very long, velvety, each with four obscure costæ, the intervals have each two lines of punctures (much hidden by the pubescence), which appear confluent transversely.

Hab.—Sikkim (Dr. Hooker). Brit. Mus.

Genus 28. *festivus*, sp. n.

Niger; thorace quinque-areato, lineis elevatis rubris; scutello lateribus parallelis, apice triangulariter emarginato; elytris rubris, quadricostatis, interstitiis, convexiusculis subinterruptis, obsolete biseriatim punctatis; unguiculis testaceis. ♀.

Long. 5 lin.

Black, with the elytra deep dull red. Antennæ long, strongly dentate. Thorax somewhat constricted in the

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middle, rather short, with five deep areolets, the elevated lines dull red. Elytra each with four costæ, the interstices slightly convex and transversely interrupted by blunt impressions, and with a line of obscure punctures on each side.

Hab.—Sumatra (E. C. Buxton, Esq.). Brit. Mus.

Genus 32. *Taphes brevicollis*, sp. n.

Ater, opacus, brevior; thorace transverso, areolis quinque obsoletis; scutello apice truncato; elytris thorace latioribus, postice ampliatis, læte rufis, quadricostatis, interstitiis biseriatim foveolato-punctatis.

♂. Long. $2\frac{1}{2}$ lin., lat. elytr. $1\frac{1}{3}$ lin.

♀. Long. $3\frac{3}{4}$ lin., lat. elytr. $1\frac{3}{4}$ lin.

Dull black, having a velvety appearance. Antennæ dull, compact. Thorax transverse, a little narrowed in front, straight at the sides, velvety, surface divided into five areolets, the central one broad lozenge-shaped, its anterior angle touching the front margin and the lateral angles nearly reaching the sides of the thorax. Elytra broader than the thorax at the base, much broader behind, red, having a velvety appearance; each with four costæ, the interstices with two rows of large punctures, the rows not separated from each other by any distinct costa.

♂. Antennæ with long pubescence; penultimate segment of abdomen triangularly emarginate.

♀. Antennæ without long pubescence; abdomen simple.

Hab.—Sarawak (Wallace). Brit. Mus.

Genus 32. *Taphes frontalis*, sp. n.

Ater, opacus; fronte inter antennas sat acute producta; thorace tomentoso, transverso, obsolete quinque areato; elytris opacis, rubris, postice latioribus, quadricostatis, interstitiis biseriatim foveato-punctatis.

♂. Antennis longe pilosis.

Long. $3\frac{1}{2}$ lin.

Dull black, with a velvety appearance. Antennæ of the male fringed with long fine hair. Forehead between the antennæ rather acutely prominent, as in *Platycis minutus*, F., but more acutely. Thorax small, strongly transverse, a little narrowed in front, the sides straight, deeply impressed on each side, and with a broad lozenge-shaped areolet on the disk. Elytra deep dull red, rather

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broad, especially posteriorly, each with four costæ, the interstices broad, with double rows of rather irregular square punctures.

Hab.—Sumatra (E. C. Buxton, Esq.). Brit. Mus.

Very near to *brevicollis*, but the formation of the forehead is different, the joints of the antennæ are more elongate, and the elytra are of a much deeper red.

Pyropterus sculpturatus, sp. n.

Nigro-piceus, opacus, subpubescens; antennis crassis; thorace parvo, antice angustiori, quinque areato; elytris rubris quadri-costatis, costis validis, interstitiis carinis validis transversis numerosis.

Long. 3½ lin.

Resembles *Pyropterus affinis*, Payk., but is relatively shorter, the sculpture is much stronger and the elytra are deeper red. Antennæ very stout, the 2nd and 3rd joints small and transverse. Thorax smaller than in *affinis*, the margins more thickened, the elevated lines on the thorax more pronounced and the mesial lozenge-shaped areolet is much broader. Elytra relatively shorter than in *affinis*, the sculpture is similar, but the costæ are much more strong, especially the transverse ones, which are also very regular.

Hab.—Sarawak. Brit. Mus.

Cladophorus aberrans, sp. n.

Fuscus, pubescens; antennis brunneis, ramis fuscis brevioribus; thorace sordide testaceo, medio parum constricto; scutello apice fere truncato; elytris quadricostatis, interstitiis fortiter transversim punctatis, basi costis intermediis brevibus, humeris brunneo-testaceis; coxis pallidis.

Long. 4 lin.

Antennæ brownish, with the apex of each joint, the branch (which is very little longer than the joint itself) blackish. Thorax obscure testaceous, a little constricted in the middle, divided into seven distinct areolets. Elytra with the shoulders and the basal half of the suture and lateral margin brownish-yellow; each elytron with four distinct costæ, which, near the base, turn away from the scutellum; the interstices are strongly punctured with transverse punctures, in the 1st, 2nd and 3rd interstices there are short intermediate costæ near the base.

Hab.—Aru Is. (Wallace). Brit. Mus.

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Cladophorus restrictus, sp. n.

Fuscus, pubescens; antennis longe flabellatis; thorace septem areolato, lineis elevatis limboque pallidis; scutello apice emarginato; elytris basi ipsâ anguste sordide flavâ, medio parum constrictis, quadri-costatis, interstitiis biseriatim obsolete subtiliter punctatis, costis intermediis basi apiceque solum perspicuis; femorum basi genubusque sordide flavescentibus.

Long. 4 lin.

Thorax a little narrowed in front, the sides somewhat straight; surface divided into seven areolets, the four anterior nearly equal, the incrassate margins testaceous, the elevated lines pale pitchy. Scutellum deeply emarginate at the apex. Elytra with the extreme base brownish-yellow, a little narrowed in their middle, each elytron with four fine costæ (of which the 2nd and 3rd slightly turn from the scutellum near the base), the interstices are rather finely and obscurely punctured in double rows, near the base and at the apex a very fine short costa may be seen between each pair of the complete costæ, but those at the apex are very obscure.

Hab.—Waigiou (Wallace). Brit. Mus.

Genus 35. *luteolus*, sp. n.

Flavus; antennis infuscatis; thorace antice angustato, marginibus evidenter punctatis, septem-areato, angulis posticis valde acutis; scutello subrotundato, postice medio acute exciso; elytris septem costatis, costâ primâ basi trifurcatâ, 2ª, 4ª et 6ª magis elevatis, interstitiis sat fortiter transversim punctatis.

Long. 5¼ lin.

Thorax rather long, narrowed anteriorly, a little enlarged before the posterior angles, which are very acute; the anterior and lateral margins are rather strongly punctured; surface divided into seven areolets, but the lateral ridges scarcely join the mesial lanceolate areolet. Scutellum rounded, with a small acute notch in the middle of the posterior margin. Elytra opaque, each with seven costæ, the first dividing into three near the base, the second, fourth and sixth more elevated than the others, the interstices strongly punctured with transverse punctures.

Hab.—Aru Is. Brit. Mus.

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Genus 36. *Trichalus acutangulus*, sp. n.

Flavus; antennis flavo-fuscis; thorace antice angustato, marginibus reflexis supra granulato-punctatis, angulis posticis valde acutis; scutello subquadrato, apice triangulariter emarginato; elytris septem costatis, costâ primâ basi trifurcatâ, 2ª, 4ª et 6ª magis elevatis, interstitiis sat evidenter uniseriatim punctatis.

Long. 4⅔ lin.

Thorax shining in the middle, with a single mesial lanceolate areolet, the anterior and lateral margins thickly punctured. Scutellum not rounded at the sides, triangularly emarginate at the apex. Elytra opaque, each with seven costæ, the first dividing into three at the base, the second, fourth and sixth much more elevated than the others, the interstices rather strongly punctured.

Hab.—Dory, New Guinea (Wallace). Brit. Mus.

Trichalus æmulus, sp. n.

Elongatus, ater; thorace antice supra granulato; elytris basi flavo, tricostatis, interstitiis biseriatim foveato-punctatis.

Long. 5 lin.

Thorax above granulate-punctate in front. Scutellum rather large, broader than long, yellow, a little fuscous in the middle, truncate at the apex. Elytra very long, subparallel, the basal third ochraceous; each elytron with three distinct costæ (besides the three subscutellar costæ, which are distinct), the interstices with two lines of well-defined transverse punctures, the lines of punctures divided by a fine costa.

Hab.—Aru Is. (Wallace).

Thorax relatively broader than in the following species (*anceps*), and the punctures of the elytra are much more regular and defined, and the intermediate costæ, although fine, are distinct.

Trichalus anceps, sp. n.

Elongatus, ater, opacus; thorace antice angustato, supra antice granulato; elytris basi flavis, tricostatis.

Long. 3 lin.

Antennæ very long and compressed. Thorax small, longer than broad, narrowed in front, above in front distinctly granular. Scutellum fuscous, concave, sub-

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quadrate, scarcely emarginate at the apex (nearly straight), the angles blunt. Elytra very long, dull black, with the basal fifth yellow; the three costæ on each are well marked, and there is a short distinct costa near the scutellum; the usual transverse rugulæ of the interspaces are irregular and much broken, for the most part only appearing like granules; there are no intermediate costæ visible.

Hab.—Batchian. Brit. Mus.

Genus 37. *dispar*, sp. n.

Elongatus, nigro-fuscus, griseo-pubescens; thorace impressionibus septem notato; scutello apice exciso; elytris sat convexis sordide flavis, apice infuscato, costis obtusis quatuor instructis, interstitiis angustis parum convexis.

Long. 4½ lin.

Antennæ blackish, with grey pubescence. Thorax grey-fuscous, with paler pubescence, the elevated parts paler; surface divided into seven areolets, the ridges dividing them blunt and not well defined, there is also a round fovea within each anterior lateral areolet. Scutellum greyish, with the apex very deeply excised. Elytra rather convex, brownish-yellow, infuscated at the apex; each elytron with four rather broad blunt costæ, which are effaced at the base, the interstices very slightly convex, with a line of obscure punctures on each side towards the apex.

Hab.—Malacca. Brit. Mus.

Genus 37. *conformis*, sp. n.

Nigro-fuscus; griseo-pubescens; thorace limbo flavescenti, disco utrinque bi-impresso; elytris sat convexis, sordide flavis, apice infuscato, costis quatuor obtusis instructis, interstitiis obsolete biseriatim punctatis.

Long. 3¼ lin.

Antennæ blackish, with grey pubescence. Thorax fuscous with the margins dirty yellow; within each of the four angles there is an ill-defined impression, and in front there are three short longitudinal carinæ. Scutellum very deeply triangularly excised, yellowish. Elytra brownish-yellow (except at the apex); each elytron has four rather broad blunt costæ, which are distinct to the base; the interstices with two rows of obscure subconfluent punctures.

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This species is very close to the preceding, but the areolets on the thorax are not defined, and the costæ of the elytra are distinct to the base.

Hab.—Sarawak (Wallace). Brit. Mus.

Genus 38. *exilis*, sp. n.

Flavescens, pubescens; thorace antice ruguloso, postice utrinque impresso, angulis posticis acutis; scutello apice truncato; elytris (apice ipso infuscato) pubescentibus, singulis costis tribus, quarum illâ juxta scutellam postice abbreviatâ; antennis pedibusque infuscatis.

Long. 3 lin.

Head with a longitudinal impressed line; antennæ blackish. Thorax narrowed anteriorly, surface rugulose in front, with a smooth mesial line, transversely impressed behind and with a shallow impression on each side. Elytra a little narrowed towards the apex where they are not united at the suture; each elytron with three costæ; that next the scutellum is only half the length of the elytra; the third and fourth nearly reach the apex; the interstices are flat. Legs and abdomen infuscated, tarsi yellowish.

Hab.—Sarawak (Wallace). Brit. Mus.

Genus 40. *Scarelus longicornis*, sp. n.

Elongatus, ferrugineo-flavus, pubescens; antennis longissimis, filiformibus, nigris; thorace parvo, antice angustato, lineâ medianâ elevatâ; elytris parallelis, depressis, tricarinatis, interstitiis impressionibus numerosis transversis, apice anguste nigro; pedibus fuscis.

Long. 2¼ lin.; antennæ 3½ lin.

Head rather prominent, eyes small; antennæ longer than the whole insect, filiform, the 1st and 2nd joints yellow, the rest black. Thorax with a distinct mesial elevated line, sides gently reflexed, posterior angles acute. Scutellum slightly narrowed towards the apex which is very slightly notched. Elytra a little broader than the base of the thorax, tipped with black; each with three costæ, the first rather obscure, the interstices with very numerous transverse impressions. Legs pitchy; tarsi rather short and stout.

Hab.—Java (J. C. Bowring, Esq.). Brit. Mus.

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Genus 40. *Scarelus orbatus*, sp. n.

Fuscus; antennis longissimis, simplicibus, compressiusculis, parallelis; thorace trapeziformi, fusco-flavo, utrinque excavato; elytris basi fusco-flavis, parallelis, tricostatis, interstitiis transversim costulatis.

Long. 2¼ lin.

Antennæ longer than the whole insect, pubescent, not dentate, parallel, slightly compressed, the second joint not visible. Thorax small, narrowed in front, dirty-yellowish, with a complete mesial carina. Elytra dirty-yellowish at the base, with three distinct costæ, the intervals with numerous transverse impressions.

Hab.—Singapore. Brit. Mus.

Genus 41. *Libnetus pumilio*, sp. n.

Niger, velutinus; thorace trapeziformi, supra excavato; elytris dimidio basali flavo, quadricostatis, interstitiis planis, subtiliter obsolete punctulatis.

Long. 2⅛ lin.

Antennæ velvety, three-quarters the length of the elytra, gradually tapering from the fourth joint to the apex. Head small. Thorax small, trapeziform, transverse, deeply excavated above. Elytra clear yellow for a little more than half their length, a little narrowed in the middle, each with four narrow slightly-elevated costæ, the intervals flat, very finely and obscurely punctured.

Hab.—Ceylon (Dr. Thwaites). Brit. Mus.

Genus 43. *Dexoris insignis*, sp. n.

Ochraceus, subvelutinus; antennis basin versus obscurioribus; thorace trapezoidali, antice rotundato, subnitido, supra in partes tres diviso; scutello basi angustato, apice fere dilobo; elytris parallelis, depressis, tuberculis minutis obtusis crebre adspersis.

Long. 3 lin.

Dull ochraceous, appearing velvety. Head longitudinally impressed above; eyes black; antennæ thickest at the 3rd joint, gradually tapering to the apex, brown at the base, becoming yellow towards the tip. Thorax transverse, somewhat rounded in front, rather straight

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at the sides, above with a well-marked oblique carina on each side, reaching from the middle of the hind margin to the anterior margin just above the eye. Scutellum narrowed at the base, deeply notched at the apex. Elytra flat, parallel, velvety, closely beset with minute blunt tubercles.

Hab.—Sierra Leone. Brit. Mus.

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E. A. Smith, del. et lith.

Mintern Bros. imp.

Gynacantha plagiata

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VIII. *Description of a new Dragon-fly* (Gynacantha), *from Borneo.* By Chas. O. Waterhouse.

[Read February 6th, 1878.]

(Pl. IV.)

At the June Meeting of this Society I exhibited and gave a brief description of perhaps the largest species of Dragon-fly known, and at the time I promised to give a fuller description of the specimen. I have not been able to do so until now, chiefly on account of the difficulty in getting the plate drawn which was to accompany my description.

The specimen was lent me by Mr. Hugh Low, who received it from Borneo.

Gynacantha plagiata, C. Waterh., ♀, Pl. IV. Proc. Ent. Soc., Oct. 1877, p. 10.

Head with the vertex and occiput pitchy black; the face, labrum, base of the mandibles and the back of the head yellowish. Thorax fuscous, with two broad oblique fulvous stripes on each side. The abdomen is dark pitchy, but is doubtless much discoloured; the 8th and 9th segments above end on their posterior margin in a strong sharp triangular tooth, that on the 8th being the smaller; the superior appendages of the 10th segment very slender (almost filiform), acute; the 10th segment beneath with four short strong acute triangular teeth. The wings are hyaline, but have a pitchy-brown border along the anterior margin as far as the stigma, and a broad band of the same colour across each wing near the apex, that on the posterior wing extends rather more along the posterior margin than in the fore wings. The stigma is dark pitchy, that of the fore wings is 4 mill., that of the hind wings nearly 5 mill. long.

The neuration of the wings and the remarkable structure of the apical segments of the abdomen are well represented in the plate; the abdomen itself, however, is rather too narrow in the figure, especially in the middle. Legs black, with the femora piceous except at the apex.

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Length of abdomen 2¾ inches; length of hind wing 3⅛ inches.

Hab.—Borneo.

Note.—Mr. MacLachlan, to whom I am much indebted for assistance in giving the characters of this species, informs me that he has seen a drawing in the possession of Baron de Selys-Longchamps representing a species from Sumatra identical with or closely allied to the one here described, and he has reason to believe that it is the intention of that author to found a new sub-genus for the reception of his species (which is also a female), on account of the formation of the apex of the abdomen.

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IX. *On the natural affinities of the Lepidopterous family* Ægeriidæ. By Arthur G. Butler, F.L.S., F.Z.S., &c.

[Read March 6th, 1878.]

(Pl. V.)

The *Ægeriidæ*, or Clear-wing moths have long been left in peace at the head of the Heterocerous *Lepidoptera*; and, notwithstanding their entire dissimilarity from the typical *Sphingidæ* in all their stages of development, nobody, to my knowledge, has hitherto attempted to locate them in a more natural position.

The slight semblance of affinity to certain of the true *Sphinges* in the form of the antennæ and expansion of the caudal tuft of some genera of Clear-wings, appears to be the sole cause of the long association of these two widely-differing families; but a microscopic comparison of the antennæ of *Hemaris* (*Sesia* of British lists) with those of *Sphecia* reveals a complete dissimilarity of structural detail. (See figs. 3, 4.)

The antennæ of *Hemaris* (fig. 3) are neither pectinated nor laminated, but their anterior surface is crossed at regular intervals by serried ranks of slightly-curved stiff hairs; whereas in *Sphecia* (fig. 4) the anterior surface is deeply and coarsely laminated, each lamina being set with short bristles; in this genus, also, the apex of the antenna terminates in a well-marked pencil of rigid hairs.

The expanded caudal tuft found in *Ægeria*, and one or two other genera, is shared in common with other families beside the *Sphingidæ*, and is far more constant among the members of that group which I am constrained to regard as nearest to the *Ægeriidæ*, than it is amongst the typical Hawk-moths.

So far for the only points which the *Sphingidæ*, to a casual observer, seem to have in common with the *Ægeriidæ*, for I suppose no entomologist who knows anything of extra-European moths would for a moment take the transparent character of the wings in some genera

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of these two families into consideration. The more salient structural differences between these groups, in addition to that noted above, may be roughly summed up as follows:—

SPHINGIDÆ.	ÆGERIIDÆ.
Palpi short and thick.	*Palpi* medium or long and far more slender.
Lateral margins of the body continuous. (Cf. fig. 23.)	*Lateral margins* constricted behind the thorax. (Cf. fig. 22.)
Posterior legs rather short, thick, usually with the tibiæ smooth and armed with short spines.	*Posterior legs* long, slender, the tibiæ frequently clothed with tufts or masses of hair, always with long spines, the tarsi sometimes adorned with hairy tufts.
Anterior wings broad and trigonate, with short discoidal cell.	*Anterior wings* narrow, elongate subpyriform, with long discoidal cell.
Posterior wings small, with very short discoidal cell.	*Posterior wings* large, with medium-sized discoidal cell.

The differences in the perfect insects therefore cover their entire structure, whilst the larvæ of the two families are as unlike, both in aspect and economy, as any two representatives of the same order can well be.

Some few years ago, when Mr. Stretch, of San Francisco, was in England, he and I were somewhat exercised in mind respecting the affinities of a strange little genus of Clear-winged moths from the New World. This genus, which I subsequently diagnosed under the name of *Acridura* (Ann. and Mag. Nat. Hist. 4th ser., vol. xv. p. 398), and referred with some misgivings to the *Zygænoid Arctiidæ*, is without doubt an aberrant *Ægeriid* allied to *Arauzona*, and combining the characters of the Clear-wings with those of the *Pyrales* and *Gelechiidæ*.

A careful study of all the genera which seemed to be allied to *Acridura* (figs. 5, 6) has manifested a gradation of structure from the *Ægeriidæ* to the *Pyrales* on the one hand, and from the *Ægeriidæ* to the *Gelechiidæ* on the other.

Before entering into identities and similarities of structure in the imago, it is, of course, extremely important to ascertain whether the larvæ of these three groups exhibit any similarity in general structure and economy. I have, therefore, examined into the characters as given

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by Mr. Stainton, and find that the following are the only differences:—

Ægeriidæ.—Larvæ with 16 feet, internal feeders.

Pyralites.—Larvæ frequently (if not always) with 16 feet, either internal feeders or rolled up in leaves.

Gelechiidæ.—Larvæ with 16 feet, either internal feeders or between leaves.

Thus it is clear that some at least of the species in each of the three groups agree in the number of their feet and their habits.

The characters of the *Ægeriidæ* reproduced in the *Pyrales* are as follows:—

The long-spined posterior legs in the whole family.

The general form and ornamentation of the body in *Glyphodes doleschallii*, several species of *Vitessa*, the genus *Azochis* from South America, and even in the common *Botys urticalis* of Europe.

The terminal anal tuft in *Phakellura*.

The narrow anterior wings in the Cingalese genus *Ilurgia*.

The transparent wings with black veins, in *Erilusa* and several other genera; but the Pearl-moths are, for the most part, semi-transparent.

The long anal sheath of *Acridura gryllina* (fig. 6) is reproduced in various species of *Botys*, notably in *B. concordalis* from the Amazons, *B. admixtalis* from Ceylon, *B. damasalis* from China, as also in *Platamonia stenosoma* of Felder (Reise der Nov. Lep. pl. cxxxiv. fig. 16) from the Viti Islands (fig. 12).

The densely-hairy second joint to the antennæ of *Acridura metallica*, of *Tinægeria* and *Arauzona*, is found also in *Omphalocera* and *Piletocera* of Lederer's Monograph (Wien. Ent. Monatschr. VII.), and occurs in a modified form in the antennæ of *Desmia funeralis* and *Zebronia jaguaralis*. (Cf. figs. 5, 9, 13, 18, with 10 and 11.)

The remarkable antennæ of *Tarsa bombyciformis* (fig. 16), in which the pectinations are fringed with stiff hair below and terminate in strong curved spines, are almost reproduced in the European *Eurrhypis pertusalis*, which, however, differs in that the pectinations taper to a point and terminate, not in spines, but in five or six stiff-curved bristles (fig. 15). In *Thersana acuta* (which is certainly a *Pyrale*), although the antennæ are somewhat compressed, the pectinations taper less than in *Eurrhypis*, but only terminate in a single rigid bristle (fig. 14).

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The lateral tuft-like processes from the subterminal segment of the abdomen, in males of the *Ægeriid* genus *Tinthia* (fig. 8) occur also in *Morocosma margaritaria*. (Cf. Lederer in loc. cit. pl. 14, fig. 7; also fig. 7 of my plate.)

The tufts and brushes of hair found on the posterior legs of such genera as *Euryphrissa*, *Tarsopoda* and *Sophona* (notably also in *Mylittia*), are evidently not unknown among the *Pyrales*. (See *Idia? scopipes* of Felder, in Reise der Nov. Lep. cxxxvi. fig. 39; cf. figs. 1, 2, 17, 20, 21.)

Thus I have shown that the whole of the marked structural characteristics of the *Ægeriidæ* are to be met with among the *Pyrales*, and therefore it only remains for me to make good my view of the affinity which they also exhibit to the *Gelechiidæ*.

The difficulty of pointing out the resemblance of the *Ægeriidæ* to the *Gelechiidæ* is nothing to that of determining where the line of demarcation between the two families is to be drawn; thus *Tinægeria* (fig. 18) is apparently a small form of *Ægeriid* with long slender-curved palpi, and a hairy second joint to its antennæ; it is, without doubt, allied to *Arauzona* (fig. 9) and to *Acridura*, less nearly to *Tinthia*, which is close to *Ægeria*; on the other hand, the *Gelechiid* genus *Exodomorpha* (fig. 19) (*Staintonia*, Staud.) is evidently the African representative of the New World genus *Tinægeria*; indeed I have hitherto only found one structural character to distinguish them by, namely, the form of the secondaries; yet *Exodomorpha* chiefly differs from *Gelechia* in the hairy second joint to its antennæ, and the non-indented apex of its posterior wings.

I think, therefore, however conservative our views may be, the similarities of structure occurring between the Clear-wings and the two groups of moths with which I have compared them above, will make it necessary for us to place them after the *Pyrales* and before the *Gelechiidæ*.

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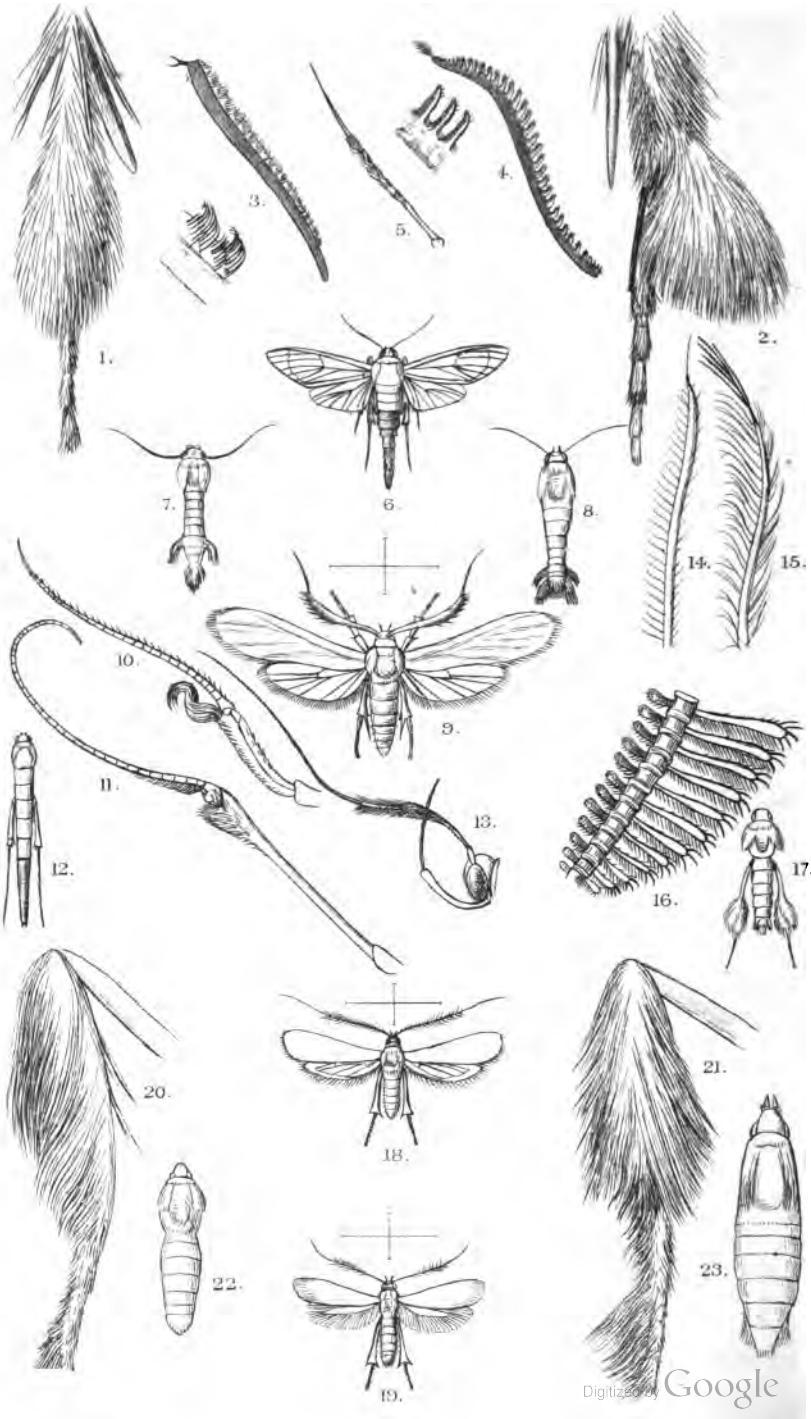

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EXPLANATION OF PLATE.

Fig. 1. Posterior tarsus of *Sophona kaliotipennis*, Walker.
2. „ tibia and tarsus of *Euryphrissa plumipes*, Walker.
3. Antenna of *Hemaris bombyliformis*, Linn.
4. „ „ *Sphecia apiformis*, Linn.
5. „ „ *Acridura metallica*, Butler.
6. *Acridura gryllina*, Butler.
7. Body of *Morocosma margaritaria*, Lederer.
8. „ *Tinthia constricta*, Butler.
9. *Arauzona basalis*, Walker.
10. Antenna of *Zebronia jaguaralis*, Guénée.
11. „ „ *Desmia funeralis*, Hübner.
12. Body of *Platamonia stenosoma*, Felder.
13. Head of *Tinægeria*.
14. Single pectination of antenna in *Eurrhypis pertusalis*, Hübner.
15. „ „ „ *Thersana acuta*, Walker.
16. Part of antenna of *Tarsa bombyciformis*, Walker.
17. Body and posterior legs of *Idia? scopipes*, Felder.
18. *Tinægeria ochracea*, Walker.
19. *Exodomorpha divisella*, Walker.
20. Hind leg of *Botys glaucusalis*, ♂, Walker.
21. „ „ *Tarsopoda remipes*, Butler.
22. Body of *Sphecia apiformis*, Linn.
23. „ *Hemaris*.

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X. *On some* Nitidulidæ *from the Hawaiian Islands.*

By D. Sharp.

[Read April 3rd, 1878.]

The beetles enumerated and described in this paper were collected by the Rev. T. Blackburn in the Sandwich Islands, and are as complete a series of the species of the family as he could send me at the time. There are about twenty species, and they all belong to the tribe *Carpophilidæ*, to which tribe the portion published of Mr. Murray's Monograph of the family is chiefly devoted. This author, whose decease we have so recently lamented, has enumerated 234 species as composing the tribe. It would seem, therefore, that these Hawaiian *Carpophilidæ* are sufficiently numerous to throw some light on the relationships of the fauna of this isolated group of islands, and I have no doubt that ultimately they will be of great use in this respect. At present, the state of the classification of the family, and the incomplete knowledge we have of its exotic members, should prevent any large generalizations being stated except in a very dubious manner. Putting aside certain species which are nearly cosmopolitan, and others, which from their habits are more easily distributed than is usually the case with beetles, there yet remains a considerable number of species which may be considered as undoubtedly indigenous to the islands; and although I am not able to express at present any decisive opinion on this point, I think it probable that these insects will find their nearest allies in the Indo-Malayan and Austro-Malayan subregions as defined by Mr. Wallace.

We require information, which is not at present forthcoming, as to the distribution of the insects among the different islands of the group, and it will be of much value if Mr. Blackburn can procure us this knowledge.

We know, also, very little indeed of the *Nitidulidæ* of the other groups of islands of the Polynesian subregion; almost all that has been published on this point is contained in Fairmaire's paper on the *Coleoptera* of Polynesia, published in the Revue et Magazin de Zoologie, June,

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1849, and the preparation of this paper is not such as to enable it to be utilized for the purposes to which I am now alluding.

I hope the remarks I have above made on the deficiencies of our knowledge of the entomology of these parts of the world may fall in the way of some persons who will try to diminish our ignorance.

I hope, too, that Mr. Blackburn himself, whose skill and experience render his residence in these islands of very special value, may be able to continue his researches in Oahu, and, if possible, extend them to the other islands of the group.

The material he has at present transmitted me has not been sufficiently ample to enable me to decide, in certain difficult cases, as to the sexual characters of some of the species, and until this is done, the specific distinctions themselves are involved in some doubt. It is stated by all the authors, who have lately treated on the *Nitidulidæ*, that the small supplementary segment at the extremity of the hind body, which exists in some individuals and is absent in others of the same species, is characteristic of the male. I find, however, that this is often incorrect, and, in some cases, it is the females that are thus constructed. In *Brachypterus vestitus*, Kies., and *B. gravidus*, Murray, it is certainly the females which bear the additional segment, and yet, in the closely-allied *Amartus rufipes*, Lec., a similar structure is (as correctly stated by Leconte) characteristic of the male. In the genus *Conotelus*, when an additional segment is extruded, it is more usually in the female; but this is not invariably the case, for in some individuals of the other sex, the usually internal terminal segment may have its apex protruded, while, on the other hand, in the female this segment is occasionally much retracted; in the case of *Conotelus*, therefore, recourse must be had to the form of the dorsal and ventral plates of the last truly external segment, if the sexes are to be correctly discriminated without an examination of the internal organs. These facts have made me hesitate before forming an opinion as to the sex of the few specimens I have seen of the species of the *Brachypeplus impressus* group.

Goniorycтus.

This is a new generic name proposed by Mr. Blackburn, and adopted by me for three species which are very

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distinct from any others here described. The coarsely-facetted eyes (a character which will, it appears to me, prove of great value in the classification of the beetles called *Nitidulidæ* in the Munich Catalogue) will distinguish the species from all the other Hawaiian allies here treated of, except *Haptoncus;* while, from the two species I attribute to that genus, the abbreviated elytra and the great development of the tarsi most satisfactorily differentiate *Gonioryctus.* I assign three species to the genus, and of these three the structural characters, by which I have defined the genus, are least developed in *Gonioryctus monticola.* In Mr. Murray's scheme of classification, the genus had better find a place near *Brachypeplus* and *Campsopyga,* but I anticipate that when a classification comes to be made, dealing more completely with the external parts than does Mr. Murray's, the affinities of *Gonioryctus* will be considered to be more in the direction of *Epuræa.*

1. *Gonioryctus latus,* n. sp. Latus, subtus testaceo-ferrugineus, supra plus minusve infuscatus, sed haud variegatus et vix æneo-micans, subopacus, crebre punctatus, tenuiter pubescens; prothorace anterius subtruncato angulis anterioribus nullo modo prominentibus; elytris obsoletissime sulcatis, marginibus pone humeros anguste explanatis. Long. 7—7½ mm.; lat. 3⅓—3½ mm.

Antennæ with joints 3—5 much elongate, the club very much developed, being both broad and long. Head densely punctured, distinctly infuscate and with a slight brassy tinge. Thorax strongly transverse, the sides broadly explanate behind; the base truncate, very slightly emarginate over the scutellum, the hind angles not in the least rounded; the surface closely punctured. Elytra not twice as long as the thorax, with broad but very indistinct grooves, closely but not distinctly punctured. Exposed dorsal segments more shining than the rest of the surface, distinctly but not closely punctured, their pubescence almost invisible.

In the male the apical dorsal segment has the apex quite rounded, while in the female it is emarginate and depressed between the two angles; the small additional segment of the male has the hind margin furnished with rather long pubescence; in the male the apical ventral segment has the hind margin a little bisinuate and furnished with very short ciliæ, while in the female it is truncate and furnished

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with long hairs on each side and with very short ciliæ in the middle.

I have received two males and a female of this species from Mr. Blackburn as No. 76; he states that it occurs on the flowers of the palm in the mountain forests.

2. *Gonioryctus Blackburni*, n. sp. Haud latus, testaceo ferrugineus, thorace abdomineque indistincte fusco-vittatis; elytris infuscatis, circa scutellum dilutioribus, distincte sed parum profunde sulcatis, interstitiis angustis, marginibus pone humeros vix explanatis. Long. $5\frac{1}{3}$ mm.

Though very much smaller than *Gonioryctus latus*, this species is closely allied to it, but is undoubtedly quite distinct; the punctuation of the exposed dorsal segments is sparing and indistinct.

The male has the terminal portion of the apical dorsal segment more elongate than in *G. latus*, and its hind margin quite straight, the small additional segment is ciliate as in *G. latus*, and the hind margin of the apical ventral segment is shaped as in that species.

I have received a single specimen as No. 77, and am informed that solitary individuals are found rarely on flowers of trees in the mountains.

Obs.—Though I have not myself seen the female of this species, I am informed by Mr. Blackburn that it has the apical dorsal segment distinctly tuberculate in the middle near the hind margin, and that this latter is rounded, and not emarginate as in *G. latus*.

3. *Gonioryctus monticola*, n. sp. Haud latus, ferrugineus, fere opacus, tenuissime pubescens, fortiter punctatus; prothorace minus transverso, posterius angustato, anterius emarginato, angulis anterioribus per-rotundatis; elytris thorace haud sesqui longioribus, obsolete striatis, lateribus late explanatis; segmentis dorsalibus fortiter punctatis. Long. $5\frac{1}{3}$ mm.; lat. $1\frac{7}{8}$ mm.

In this species the elytra are scarcely sulcate, the obscure longitudinal depressions are, perhaps, more like striæ than in *Gonioryctus latus* or *G. Blackburni*.

The male has the dorsal plate of the last segment with its apical portion narrower than it is in *G. latus*, its hind margin being rounded; in other respects the characters of this sex are similar in the two species.

I have received a single specimen from Mr. Blackburn

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as No. 78, and am informed that the species is very rare, and is found near the summit of the highest peak in Honolulu.

Obs.—Mr. Blackburn informs me that in the female the apical dorsal segment has a large obtuse tubercle with a faint depression on each side of it, and that its hind margin is rounded-truncate, and has an elevated border.

The following description embodies such of the characters of *Gonioryctus latus*, of *Gonioryctus Blackburni*, and of *Gonioryctus monticola*, as I have been able to observe:—

Eyes coarsely granulated, angular behind, and so forming the hind angles of the head, which is abruptly constricted posteriorly, and has a comparatively narrow neck. Antennal furrows broad, abruptly turned inwards so as to be subangulate. Antennæ with a largely-developed abrupt three-jointed club. Prosternal process greatly turned upwards behind the front coxæ (less so in *G. monticola* than in the other two species); its extremity without ciliæ. Tibiæ not serrate externally, their apical spurs excessively short; tarsi broad and largely developed, with peculiarly elongate and narrow lobes. Hind body with three corneous dorsal segments, of which two-and-a-half are left uncovered by the abbreviated elytra; the fimbriæ broad, and their inner edge curved.

Brachypeplus.

The ten Hawaiian species I associate together under this generic name exhibit so much diversity of facies, that anyone treating of them without reference to the described species from other parts of the world would be strongly induced to treat them as forming four or even five distinct genera. The variety of the forms grouped together by Mr. Murray, as forming the genus *Brachypeplus*, prevents me, however, from forming separate genera for the Hawaiian insects. I have, therefore, thought it will prove more convenient to tabulate the characters of these groups, and not create any names for them. None of the groups seem to agree well with any of the subgenera to which names were assigned by Murray, but I expect from Murray's figure of *Brachypeplus cuneatus* that my *Brachypeplus impressus* group will be found to approximate to his Austro-Malayan subgenus *Selis*.

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Form flat, rather short and broad; prosternal process short, a little curved upwards, broad at the apex, truncate and not ciliate; head truncate immediately behind the eyes, which reach to the hind angles; tarsi rather largely developed, lobes of the third joint comparatively elongate and slender. — *Brachypeplus discedens* and *Brachypeplus punctiveps.*

Form rather broad and parallel, but only moderately elongate and depressed; prosternal process scarcely curved upwards at the apex, which is very broad and ciliate; hind portion of head oblique behind the eyes; tarsi rather broad, lobes of the third joint rather long. — *Brachypeplus robustus.*

Form narrow and very elongate, parallel, not excessively depressed; prosternal process not curved upwards at the apex, which is broad and ciliate; hind margin of head slightly oblique behind the eyes; tarsi not broad, lobes of the third joint distinct but not elongate. N.B.—These characters, with the exception of the form, are not very different from those assigned to the *Brachypeplus robustus*, and the two may, perhaps, be correctly associated in a first synthesis. — *Brachypeplus Reitteri.*

Form excessively depressed (scarcely thicker than a sheet of writing paper), parallel and elongate; prosternal process not curved upwards at the apex, which is moderately broad and ciliate; hind margin of head truncate behind the eyes; tarsi quite narrow, lobes of the third joint quite undeveloped. — *Brachypeplus infimus.*

Form rather broad and short, much acuminate at the hind extremity, moderately depressed; prosternal process short, its extremity slightly directed upwards, not ciliate; head not quite truncate behind the eyes, which do not extend to the hind angles; tarsi rather broad, but short, with the lobes of the third joint little or moderately developed. — *Brachypeplus impressus.* ——— *inæqualis.* ——— *omalioides.* ——— *brevis.* ——— *aper.*

N.B.—This group approaches to the *Brachypeplus discedens* group (by means of *Brachypeplus aper*), from which its distinctive characters are the less of development of the eyes and tarsi; the *Brachypeplus brevis* is the species in which the diminution of these parts reaches its greatest extent. The group appears to approximate to the subgenus *Selis* of Murray, which is composed of three species from Batchian and Mysol.

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1. ***Brachypeplus discedens***, n. sp. Latiusculus, haud elongatus, depressus, dilute castaneus, sat nitidus supra plus minusve infuscatus et (præsertim in elytris) æneo-micans, antennis pedibusque testaceis, illarum clava fusca; capite crebre distincte punctato, pone oculos recte truncato, angulis vix acute prominulis; prothorace fortiter transverso, anterius recte truncato, lateribus pone medium leviter angustatis sed vix curvatis, ad angulos posteriores evidenter deplanato, crebre fortiter punctato; elytris seriatim subtiliter punctatis, interstitiis punctatis; abdomine crebrius punctato. Long. 4¾ mm.; lat. 2 mm.

The antennæ are rather short, with a broad, not elongate club. The elytra appear at first sight to be irregularly and finely punctured, but on a more careful inspection it is seen that on their disc the punctuation has an arrangement in longitudinal series with intercalated interstitial series; this may be best observed by looking at them from the front; towards the sides and hind angles no such serial arrangement of the sculpture can be detected. The exposed dorsal segments are moderately closely punctured, especially near the sides, their pubescence is extremely short and indistinct.

The sex of the only individual I have seen is quite uncertain to me.

2. ***Brachypeplus puncticeps***, n. sp. Latiusculus, haud elongatus, depressus, fusco-castaneus, sat nitidus, supra æneo-micans, prothoracis marginibus ferrugineis, antennis pedibusque rufo-testaceis; capite dense subtiliter punctato, pone oculos recte truncato, angulis vix acute prominulis; prothorace fortiter transverso, lateribus rotundatis, ad angulos posteriores minus deplanato, crebre fortiter punctato; elytris seriatim subtiliter punctatis, interstitiis punctatis; abdomine crebrius punctato. Long. 4¾ mm.; lat. 1¾ mm.

Closely allied to *Brachypeplus discedens*, but slightly more parallel, with the head more densely and finely punctured, and the form of the thorax a little different, it being a little less narrowed in front and less flattened near the posterior angles, so that the curvature of the sides seems more regular.

I do not know the sex of the only individual I have seen, but I think it is a male.

Obs.—Mr. Blackburn sent me this and the preceding species as No. 85, and observed, that "it is not at all

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uncommon on the flowers of various trees in the mountain forests. The ♂ and ♀ seem almost indistinguishable; the two specimens enclosed represent what I consider to be the two sexes."

It will be seen that I have treated what Mr. Blackburn considered to be the two sexes as two closely-allied species, fancying that the only individual I have seen of each may be a male; it is, however, quite possible Mr. Blackburn may be right; when I have had an opportunity of inspecting more specimens, so as to arrive at a certain conclusion as to the sexes, I shall be able to settle the question.

3. *Brachypeplus robustus*, n. sp. Sat latus et elongatus, subparallelus, depressus, fere opacus, testaceus sed plus minusve infuscatus, leviter æneo-micans, antennis fuscis basi testaceo; capite pone oculos mediocres obliquo, crebre fortiter punctato; prothorace fortiter transverso, anterius leviter emarginato, angulis posterioribus fere rectis, fortiter crebre punctato, disco obsolete tri-impresso; elytris opacis, coriaceis, conspicue seriatim punctatis, interstitiis latis, haud punctatis, angulo suturali recto; abdomine dense punctato. Long. 6 mm.; lat. 2 mm.

In one sex, which I have no doubt is the male, the apical portion of the last segment of the hind body is less elongate, and leaves exposed a narrow supplementary segment; in each sex the hind margins of both dorsal and ventral segments are nearly truncate.

I have received a pair of this species as No. 84, and am informed by Mr. Blackburn that he found a small colony of the species in the chinks of the bark of a living tree on one of the higher mountains.

4. *Brachypeplus Reitteri*, n. sp. Elongatus, angustulus, parallelus, haud omnino depressus, fere opacus, fusco-niger, vel piceus, pedibus sordide testaceis; prothorace transversim subquadrato, lateribus subrectis, crebre fortiter punctato; elytris leviter sulcatis, sulcis latis dense que punctatis, interstitiis angustis, crebre seriatim punctatis. Long. 6 mm.; lat. $1\frac{2}{3}$ mm.

In the male the dorsal and ventral plates of the apical segment are not so elongate as in the female, and leave exposed a narrow, supplementary anal segment; the hind margins of both plates are rather broad and nearly truncate; in the female the apical dorsal plate is narrow at the

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extremity, and shows a small notch there; the ventral plate is slightly broader at the hind margin, and nearly truncate.

This species is found on the mountains in the stems of banana; Mr. Blackburn has sent me one male and three females, as Nos. 18 and 19 respectively.

I have named this species in honour of Herr Reitter, who has taken up the study of the *Nitidulidæ*, and pursued it with much ability. His memoir on the European species of *Meligethes* is one of the most important recent additions to our knowledge of European *Coleoptera*.

5. *Brachypeplus infimus*, n. sp. Omnium perdepressus, elongatus, parallelus, subopacus, sine pubescentia, fuscus vel fusco-testaceus, pedibus dilutioribus; oculis vix ad angulos posteriores capitis rectos attingentibus, haud magnis; prothorace transversim oblongo, crebre subobsolete punctato; elytris profundius striatis, interstitiis seriatim sed vix perspicue punctatis; abdomine subtilissime punctulato. Long. 3½—4½ mm.; lat. 1 mm.

The excessively-depressed form of this species distinguishes it completely from any other of the Hawaiian *Nitidulidæ* yet found. The punctuation of the head is close, and is rather coarser or more distinct than that of the thorax. The thorax is rather strongly transverse, is truncate in front with the anterior angles rounded, the sides nearly straight, the base a little rounded so that the not sharply-marked hind angles are obtuse; the surface is moderately closely but rather indistinctly punctured, the disc more or less flattened or depressed. The striation of the elytra is very regular, and sharply defined. The exposed dorsal segments are nearly as long as the elytra.

In one of the sexes the apical dorsal segment is less elongate at the apex than in the other sex, and leaves exposed a small supplementary segment, and in this sex the terminal three ventral segments are densely pubescent on each side; this is, perhaps, the male, but I feel by no means sure about it.

A pair sent by Mr. Blackburn was numbered 86; the species occurs under the bark of trees in mountain forests.

6. *Brachypeplus impressus*, n. sp. Sat latus et elongatus, testaceus, irregulariter plus minusve infuscatus, subæneo-micans, nitidus, parce pubescens; prothorace

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transverso, antrorsum vix magis quam posterius angustato, disco profunde tri-vel quadri-impresso; elytris inæqualibus, striatis; abdomine sat crebre distincte punctato. Long. 3 mm.; lat. $1\frac{2}{3}$ mm.

This species is of a yellowish colour, variegated with fuscous in an irregular and no doubt variable manner. The head is closely punctured, the eyes only moderate in size. The thorax is but little emarginate in front, the sides are moderately explanate, the surface uneven, and bearing three large impressions on the middle, one in front of the other two, the front one is more or less distinctly divided into two; the punctuation is moderately coarse, but is rendered indistinct by the inequalities of the surface. The scutellum is infuscate, and is distinctly punctured. The elytra have depressed series of punctures, and their surface is rendered uneven by ill-defined depressions. The hind body is rapidly narrowed to the extremity.

Two specimens of this species have been sent me as No. 81. I am uncertain as to their sex; although each has a distinct exserted supplementary apical segment, I am not at all sure whether they may not be male and female.

7. *Brachypeplus inæqualis*, n. sp. Sat latus, testaceus, elytris obscure fusco-variegatis, nitidus parce pubescens; prothorace transverso, lateribus rotundatis, explanatis, antrorsum evidenter angustato, disco profunde tri-vel quadri-impresso; elytris inæqualibus, striatis; abdomine sat crebre distincte punctato. Long. $3\frac{1}{2}$ mm.; lat. $1\frac{1}{2}$ mm.

A single individual of this form has been sent me by Mr. Blackburn; it is so closely allied to *Brachypeplus impressus*, that I am not sure whether it will prove distinct; it is rather larger and broader, and of a more uniform pale colour; the explanate sides of the thorax are more developed, especially behind, so that the thorax appears more narrowed towards the front. I do not know the sex of the specimen; it has a rounded, not truncate, hind margin to the apical dorsal segment, and no supplementary segment is exposed.

8. *Brachypeplus omalioides*, n. sp. Sat latus, testaceus, plus minusve fusco-variegatus, vix æneo-micans,

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nitidus, tenuissime pubescens; prothorace transverso, lateribus rotundatis, basi recte truncato, angulis posterioribus nullo modo retrorsum spectantibus; disco trivel quadri-impresso; elytris vix inæqualibus, regulariter seriatim punctatis; abdomine crebre punctato. Long. $3\frac{3}{4}$ mm.; lat. $1\frac{1}{2}$ mm.

This species is closely allied to *Brachypeplus impressus*, but is undoubtedly distinct, the surface of thorax and elytra being much less uneven; the thorax is more contracted behind, the elytra are longer in proportion to their breadth, and the dorsal segments of hind body are more closely punctured. I have before me four individuals, and if I am correct in considering them all one species, it is evident that it will prove to be a variable one.

Sent by Mr. Blackburn as No. 80.

9. *Brachypeplus brevis*, n. sp. Brevis, latiusculus, posterius acuminatus, testaceus plus minusve infuscatus, sat nitidus, parce pubescens; oculis parvis; prothorace lateribus rotundatis et explanatis, disco quadri-impresso, minus distincte punctato; elytris brevibus et latis, minus argute seriatim punctatis, interstitiis alternis magis elevatis; abdomine parce punctato. Long. 3 mm.; lat. $1\frac{1}{2}$ mm.

The short, broad form, the small eyes, the elevation of alternate interstices of the elytra, and the slight punctuation of the exposed dorsal segments, will render easy the discrimination of this species.

Mr. Blackburn has sent me two individuals which he considers to be male and female; I have no doubt he is right in his supposition, though the marks of distinction are not very conspicuous; in one of the individuals, the dorsal and ventral plates of the apical segment are a little less elongate and are more truncate at the apex than in the other individual, and there is exposed a very small portion of a supplementary segment; this individual is probably the male.

The specimens were found by sifting dead leaves at the foot of a precipitous cliff, and were sent me as No. 82.

10. *Brachypeplus aper*, n. sp. Latiusculus, testaceus, fusco-variegatus, opacus, parce pubescens, dense punctatus, inter puncta reticulatus; prothorace lateribus rotundatis,

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posterius coarctatis, angulis posterioribus rectis, dorso vix quadri-impresso; elytris striatis, striis indistincte crenatis, interstitiis transversim rugosis; abdomine dense punctato. Long. 4¼ mm.; lat. 1⅛ mm.

The sculpture of this species is peculiar and readily distinguishes it; there are some small and indistinct impressions on the elytra.

The only specimen sent me by Mr. Blackburn was numbered 83, and appears to be a male; it has a small but quite distinct supplementary segment visible.

Carpophilus.

Three species of this genus have been found by Mr. Blackburn. They are all already described; two of them, indeed, are amongst the most cosmopolitan of beetles. The third is considered by Mr. Murray as peculiar to the Sandwich Islands, but he appears to have described the species from a unique specimen; and as the specimens sent me by Mr. Blackburn of the species show a great deal of variation, I should not be at all surprised if it be discovered that this third species (*Carpophilus maculatus*, Murray) is not confined to the Hawaiian group of islands.

1. *Dermestes hemipterus*, Lin.

Mr. Blackburn states that this species is very rare in the islands; indeed he has found only three individuals of it, two of them in a retired valley of the Island of Maui, and the third in Oahu, on fallen fruit.

2. *Carpophilus dimidiatus*, Er.

This insect Mr. Blackburn says is almost the commonest Hawaiian beetle.

3. *Carpophilus maculatus*, Murray.

This species is also common, and has been found by Mr. Blackburn both in Maui and Oahu. I am inclined to think, from what I recollect of the series in the British Museum, of the very variable *Carpophilus vittiger*, Murray, that this species will prove to be extremely closely allied to it; the *C. vittiger* is widely distributed in the Malay Archipelago and India.

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Haptoncus.

This genus was established by Murray on four or five species from Ceylon and the Malay Islands. It was correctly indicated by him as a transition form to *Epuræa;* he indicated, indeed, no character to distinguish it from that genus, except that two dorsal segments are left, he says, uncovered by the wing cases in *Haptoncus*, and but one in *Epuræa.* I find this character, however, to be illusory, and to depend on the amount of extension or contraction of the segments. Nevertheless, the genus may be maintained at present; for I find that the antennal grooves are less obsolete in *Haptoncus* than in *Epuræa. Epuræa luteola*, Er., from Cuba, should then, for the present, go with *Haptoncus*, although there is a difference in the underside of the head, owing to the greater development of the eyes in the Old World species. I may here remark that I do not see in what respect Reitter's *Haptoncus pauperculus* differs generically from Erichson's *Epuræa luteola.* It is described from St. Domingo, and I have in my collection specimens which agree entirely with Reitter's description. Although Herr Reitter commences his description by the words "*Epuræa lutea* (sic) *similis*," he has not made any statement as to the two species being congeneric, though I feel somewhat doubtful whether they are even specifically distinct; on this point the material at my disposition is not sufficient to enable me to speak positively.

1. *Haptoncus tetragonus*, Murray.

Two specimens sent me from Oahu seem to agree entirely with the Ceylon individuals of this species in the British Museum Collection. It seems to me pretty certain that Fairmaire's *Epuræa ocularis* from Tahiti is the same species.

2. *Haptoncus mundus*, n. sp. Testaceus, sat nitidus, parcius punctatus et pubescens; prothorace antrorsum evidenter angustato, basi utrinque leviter sinuato, angulis posterioribus subrectis, nullo modo rotundatis. Long. 2 mm.; lat. $1\frac{1}{8}$ mm.

The thorax is narrowed in front, so that it is a good deal narrower at the front angles than at the hind ones,

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the width behind the middle is very little diminished; it is ample at the sides, so that the expanded part there is rather conspicuous, especially near the hind angles; the punctuation is sparing and rather coarse. The punctuation of the thorax is similar to that of the elytra but is scarcely so distinct.

The species is rather closely allied to *Haptoncus tetragonus*, but is slightly broader; it is unspotted; the thorax is more ample at the sides, and its punctuation is coarser and more distant. It is extremely similar to the specimens of *Haptoncus testaceus* (Murray) in the British Museum, from Macassar, but is, I think, certainly distinct on account of the more explanate sides of the thorax.

I have received four specimens from Mr. Blackburn. I think they are all females.

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XI. *On some new genera and species of* Tenthredinidæ.

By P. Cameron.

[Read March 6th, 1878.]

Taxonus.

Taxonus longipennis, sp. n.

♀. Antennæ as long as the abdomen, covered with a short close pile; the middle joints thicker than the basal and apical ones; the 3rd and 4th joints nearly equal, the others becoming gradually shorter; the colour black. Head black, small, narrower than the mesothorax, the front depressed, smooth and shining, the sutures scarcely visible, the clypeus truncated at apex, the labrum rounded. Thorax red, a small spot on the front of the mesonotum, the posterior half of the sternum and of the pleuræ (except above) black; the cenchri white. Abdomen much longer than the head and thorax, rounded, black, with a bluish tinge; the apex semi-truncated; the saw not exserted. Legs bluish-black, the tibiæ and the basal joints of the tarsi grooved, punctured; the basal joint of the tarsus is as long as the other four; the tarsus itself being longer than the tibia; the calcari are short. Wings longer than the body, narrow. The first marginal cellule is rather narrow, longer than the second; the nervure is straight and issues from near the apex of the long thin stigma. The first submarginal cellule is small; the second is double the length of the first, and has a small horny point near its centre; the third is more than double the length of the second, and is very slightly wider at the apex than at the base; the fourth is shorter than the third, and is considerably widened at the apex. The first recurrent nervure is received a little in front of the second submarginal cellule; the second in the basal fourth of the third. The colour is blackish, with a hyaline space a little in front of the first recurrent nervure, and another hyaline band proceeds from the stigma to the other side of the wings where it becomes narrowed. The posterior wings are blackish at the base, faintly fuscous at

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the apex and hyaline in the middle. In the apex of the posterior wings is a well-marked appendicular cellule.

Length nearly 6 lines; alar exp. nearly 14 lines.

Hab.—Brazil.

In many respects this remarkable species differs from the ordinary species of *Taxonus*, but more especially in the form of the abdomen and in the relative lengths of the cellules in the anterior wings, which agree better with those of *Strongylogaster;* but in the form of the lanceolate cellule and in the neuration of the posterior wings, and, perhaps, also in the antennæ, it comes nearer to *Taxonus*. If it does not belong to that genus there is no other described in which it can be placed. In some of the species of *Taxonus* there is an appendicular cellule in the posterior wings.

ZARCA, gen. nov.

Antennæ densely pilose, 9-jointed, the 1st a half longer than the 2nd, with a slight pedicle at its base, the 3rd the longest, a quarter longer than the 4th, the succeeding joints become gradually shorter; the apical is sharply conical, much thinner than the 8th; the 4th, 5th and 6th are much thicker than the others; the three apical are closely packed together. The antennæ are placed immediately over the clypeus, which is very small, and over each is a large, projecting, somewhat oval tubercle. The palpi are very long. The eyes reach the base of the mandibles. The thorax has the sutures deep, the collar well developed: the scutellum is small, globular, and does not reach the elevation of the sutures on the mesonotum. The abdomen is somewhat cylindrical and ends in a sharp point; the saw projects considerably. The legs are rather long, the posterior pair being longer than the whole body; the coxæ are large, projecting, the posterior pair reaching to the fourth abdominal segment, so that the abdomen appears very short, looking at it from beneath; the tarsi are much longer than the tibiæ; its 1st joint is longer than all the others, deeply grooved and flattened on the lower surface; the 2nd joint is a little longer than the 3rd, the 4th is very small; and the 5th is nearly as long as the preceding two, and bears single, short claws. Wings with two marginal and four submarginal cellules. The marginal are nearly equal, the second having a nervure proceeding round its upper margin from the stigma to the end of the

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cellule; the marginal nervure is joined to the third submarginal, and is a little curved. The first submarginal is not half the size of the second, which is of nearly the same length as the third, but the latter is very much wider at its apex than the second, which is of nearly equal width throughout; the fourth is longer than the third, and is much widened at the apex. The first recurrent nervure is received a little in front of the middle of the second cellule, the second is joined to the second submarginal nervure. The lanceolate cellule is petiolate. There is one medial cellule in the posterior wings; at the apex is a small curved appendicular cellule.

In the alar neuration this genus does not differ much from *Blennocampa*, but otherwise is readily separated by the pilose antennæ thickened in the middle, by the large projecting coxæ (which are as large as in *Macrophya*), by the long legs, with the very long basal tarsal joint, and perhaps, also, in the appendicular cellule in the posterior wings, although we have some indications of this in some species of *Blennocampa*. The pronotum, also, is longer and more developed, and the lobes of the mesonotum are better marked.

Zarca apicalis, sp. n.

Pilose, smooth, shining, luteous; the antennæ, head, tibiæ, tarsi and apex of abdomen, black. Wings blackish, iridescent; the nervures, costa and stigma, black, the last two parts being very pilose; in the second submarginal cellule is a horny point. The two anterior tibiæ are sordid luteous, the mandibles are piceous, and the palpi pale testaceous. The tegulæ are luteous.

Length 4½ lines; alar exp. 12½ lines.

Hab.—Brazil (Swainson).

INCALIA, gen. nov.

Antennæ of the length of the mesothorax, thickish, but scarcely thickened towards the apex; densely covered with a long pile; 7-jointed, the 1st joint is cylindrical, and more than double the length of the 2nd, and nearly a fourth shorter than the 3rd, which is the longest; the 4th is about the length of the 1st; the three last are closely joined together, the 7th being a very little longer than the others, and conical. The head is rather narrow, truncated behind; the eyes projecting, reaching to near the

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base of the mandibles. The antennæ are situated immediately over the clypeus, which is small, and broadly but not deeply incised; the labrum is large, broad, and semi-truncated at the apex. The thorax is globular; the lobes of the mesonotum are very distinct; the scutellum is broad, almost truncated in front, narrowed and rounded behind, and distinctly separated from the surrounding parts, overhanging the cenchri. Abdomen longer than the head and thorax, carinated in the middle above, and semi-truncated at the apex. Legs moderately long; the posterior tibiæ bear a single spine near the middle; the tarsi are a little longer than the tibiæ; the basal joint is longer than all the others combined; the three following are nearly equal; the last is as long as the preceding three, and terminated in long curved sharp single claws. The wings have one marginal and four submarginal cellules; the first submarginal is small, the second a very little longer, and receives a recurrent nervure near its centre; the third is a quarter longer than the second, and forms nearly a parallelogram, and receives one recurrent nervure; the fourth is longer than all the rest. The marginal cellule has a nervure surrounding its upper border, and which forms at its termination a very small appendicular cellule. In the posterior wings there is also a surrounding nervure, ending in an appendicular cellule, which is slightly better marked than the one in the upper wings. There is one dividing nervure in the middle cellule (in the posterior wing) as in *Cephalocera*.

In some respects this genus comes very near to *Cephalocera*, but it may be at once distinguished therefrom by the pilose, non-clavate antennæ, the last joint especially being conical, and if anything thinner than the 6th; while in *Cephalocera* the 7th joint is thickened out into a distinct club, the joints being also bare. There is also an appendicular cellule in the posterior wing, while there is none in the other.

Beyond the non-clavate antennæ I see no reason why this genus should not be included among the *Cimbicina*, if *Cephalocera* and *Syzygonia* are to be included among them. *Incalia* forms a connecting link with the *Hylotomina*.

Incalia hirticornis, sp. n.

♀. Pilose, shining, purplish-black; thorax (except metathorax above) luteous; head deep metallic blue; the

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clypeus, labrum and mouth pale luteous. Wings deep purplish-black, with a few small "bullæ," *i. e.* transparent spots. Legs densely pilose.

Length 5 lines; alar exp. 12¼ lines.

Hab.—Ega, Brazil.

Dielocera, Curtis.

The antennæ are short, 3-jointed; the 1st joint double the size of the 2nd, truncated at its apex; the 3rd is the longest, and is grooved and keeled on the underside. Head narrower than the pronotum; the frontal sutures and antennal foveæ deep. Wings with one marginal, and four submarginal cellules, the former with a small appendicular cellule at its apex. The first submarginal cellule is small; the second long, narrow, and a little curved; the third small, not much longer than the first; the fourth is longer and very much wider than the three preceding. The second cellule receives two recurrent nervures. The lanceolate cellule and the posterior wings are as in *Hylotoma*. The legs are short and thick, the tibiæ have no spines, nor calcaria, and are a little longer than the femora; the tarsi are a fourth shorter than the tibiæ. The first tarsal joint is as long as the succeeding three, which are of equal size, and have the apices truncated; the last is as long as the preceding two, and is shaped like a closed fist, and bears on each side short single claws. The patellæ are hollow leaf-like conical expansions. The abdomen is broad, thick and truncated.

Dielocera sulcicornis, sp. n.

♀. Luteous, smooth, shining, three irregular spots on the vertex, the mesonotum (except two irregular luteous spots in front), metanotum, the basal third of the back of the abdomen, the sides of the posterior tibiæ and of the basal joints of the posterior tarsi, black. Wings blackish, clear hyaline at the marginal cellule. The cenchri are large and clear white.

Length 5⅛ lines; alar exp. 13 lines.

Hab.—Prainha, Lower Amazons. November (Prof. Trail).

The above description refers only to *D. sulcicornis*, for the typical *D. Ellisii* differs from it in many respects, and I think that *sulcicornis* may well be regarded as the

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type of a new genus. Both belong to Klug's section ii., which is distinguished by having four submarginal cellules, the marginal having also an appendicular cellule. Klug describes one species as having the antennæ forked in the ♂, and in another species he describes the antennæ as furrowed in the ♀; but he makes no mention of the structure of the tarsi, nor of the absence of calcaria. Klug further says, that the species placed by him in this section are not very naturally related beyond the similarity in the alar neuration, and even with this the situation of the recurrent nervures does not agree in all the forms.

Compared with *sulcicornis*, *D. Ellisii* has the antennæ longer and thinner, the clypeus has a much deeper incision, and it is also emarginated at the sides, the abdomen is longer and rounded at the apex; the tibiæ have short, sharp spurs, the tarsi are of the normal form, as are also the patellæ, while the claws are long, sharp and bifid. The appendicular cellule is shorter and narrower.

Dielocera (?) *crassicornis*, sp. n.

♀. Black, smooth, shining, the mesonotum with the scutellum red; the anterior tibiæ piceous in front. Wings infuscated, clearer at the apex.

Length 3¼ lines; alar exp. 6¾ lines.

Similar to *Hylotoma ephippiata*, Kl., but larger; the antennæ not reddish at the base, the anterior legs with only the tibiæ pale in front, &c. The basal joint of the tarsus is as long as all the others combined.

Hab.—Amazons.

This species apparently also belongs to Klug's second section, but it differs from *D. Ellisii* and *sulcicornis* in the first and second submarginal cellules receiving each a recurrent nervure instead of the second receiving both; the antennæ are thicker in proportion, thick, pilose, and not grooved. The calcaria are moderately long.

Obs.—It seems to me that the insect which Curtis described (Trans. Linn. Soc. xix. 250) as the ♂ of *D. Ellisii* has no relationship with that species. This conclusion I base on the great differences between the two, and besides, the evidence which Curtis gives of their connection is not very decisive. He says (p. 249), "On looking over this collection I saw two insects which were stated to be the two sexes, taken from a nest in an accom-

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panying box, in which also I found a ♀ fly." Farther on (p. 251) he mentions that there were only three males to twenty females. The ♀ belongs to Klug's second section, while the ♂ belongs to the fifth; that is to say, it has only three submarginal cellules. In the ♂, also, the clypeus is not nearly so deeply notched; the head is bluish-black, with the exception of the mouth, the meso- and metathorax bluish-black above, the posterior tibiæ are pale red; the first tarsal joint is longer. Besides the above-mentioned differences in the alar neuration in the ♂, the wings are clear hyaline instead of having three distinct-clouded bands. No doubt, as Curtis points out, the sexes in some species of *Tenthredinidæ* differ very much, but I know of no case where we have so many different marks of distinction, while in the other species of the *Hylotomides* we have not, so far as I can remember, any great diversity in coloration, and certainly none in structure. Although, then, I cannot consider them to be the sexes of the same insect, still they agree so closely in their generic characters that I think they may both be placed in the same genus. It is clear that the ♀ must be regarded as the type of the genus, as the descriptions of the mouth-organs, &c., were taken from four female specimens. The ♂ I propose to name

Dielocera Curtisi, sp. n.

♂. Bluish-black, the mouth, palpi, basal joint of antennæ, pronotum, thorax beneath, and legs red; the tibiæ and tarsi pale white at the base; the posterior tarsi with the tips fuscous. Wings clear hyaline. Antennæ forked, densely pilose.

Length 5½ lines; alar exp. 11 lines.

Hab.—Brazil.

The *Hylotoma formosa* of Klug resembles this species in some respects, but it has the posterior legs black, and the wings are clouded at the middle and apex.

Dielocera carbonaria, sp. n.

♀. Antennæ compressed, sabre-shaped, bare, the two basal joints very closely united, the second very small and truncated at the apex. Epistoma carinated, the carina spreading out on each side above the antennæ; the clypeus large, with a shallow emargination; labrum small. Wings with one marginal and three submarginal cellules;

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the first submarginal is very long and narrow, receiving two recurrent nervures, one near its centre, the other a little in front of the first submarginal nervure; the second cellule is not much shorter than the first above, but is very much shorter on the lower side; the second submarginal nervure is very much curved, and from near its upper part there issues a short prolongation, where the curve bends down towards the base of the wing (a similar projection is present in *Dielocera crassicornis*, m., as well as in the very different genus *Pterygophorus*). The legs have longish spurs. The marginal cellule is appendiculated.

Black, smooth, shining, scarcely pubescent, the anterior tibiæ and tarsi fuscous in front. Wings clear hyaline, blackish at the base, fuscous at the apex, and a broad irregular fuscous band proceeds across the middle from the stigma. The apical half of the posterior wing is fuscous; the costa, stigma, and nervures are black.

Length 3½ lines; alar exp. 9 lines.

Hab.—Villa Nova, Brazil.

Except in having only three submarginal nervures this insect agrees very well otherwise with *D. crassicornis*. *D. Curtisi* differs from it in having the second submarginal cellule very much smaller; the first and second submarginal nervures are scarcely curved, the incision in the clypeus is deeper and narrower. The cheeks are more projecting, and the calcaria are shorter. *Carbonaria* appears also to come near to the genus *Themos*, Norton, but that has not the marginal cellule appendiculated.

I hope to prepare shortly a generic revision of the South American *Hylotomides*.

TRAILIA,* gen. nov.

= *Hylotoma*, section 8, Klug. Yahrb. p. 249.

Antennæ about half the length of the body, densely pilose, the second basal joints small, of nearly equal size; the third slightly thickened at the middle, the apex conical. Head small, front carinated, the carina spreading out on each side. Wings with one marginal (which has

* I have named this genus after my friend Professor Trail.

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no appendicular cellule) and three submarginal cellules. The first submarginal cellule is long and narrow, and receives near its apex one recurrent nervure; the second is shorter and broader than the first, and is a fourth longer on the upper than on the lower side, through the second submarginal sloping towards the base of the wing, and it receives a recurrent nervure near its apex. The lanceolate cellule and the posterior wings are as in *Cyphona*.

This genus comes near to *Cyphona*, but differs in its long, densely pilose antennæ, in having only three submarginal cellules, and in its more globular head.

Trailia urcacensis, sp. n.

♀. Antennæ black, the basal joint pale luteous. Head pale luteous, the tips of the mandibles piceous. Thorax and abdomen pale luteous, except a small black spot over the anus; pilose: the sheaths of the saws projecting. Legs pale luteous, the tarsi and apical half of posterior tibiæ blackish; the spurs long and curved. Wings hyaline, clouded at the apex; the costa and stigma black, and densely pilose.

Length 2¾ lines; alar exp. 5½ lines.

Hab.—Urçaca, Rio Purus, Amazons. November (Prof. Trail).

Trailia analis, sp. n.

♀. Luteous, pilose, the antennæ (except the two basal joints), the head (except the mouth), the greater part of the mesonotum, the anal segment, the apex of posterior tibiæ and the posterior tarsi, black; the mandibles are piceous. Wings hyaline with a yellowish tinge; the costa and stigma pilose, pale luteous; the base and the apex of the wings from the stigma deeply infuscated.

Length 4 lines; alar exp. 9 lines.

Hab.—Brazil.

The antennæ are longer than in the preceding species, and have the apices more sharply pointed. The calcaria are pale luteous.

Trailia compressicornis, sp. n.

♀. Luteous, and covered with a fine, close whitish pile, the antennæ, the head (except the mouth), the tibiæ and tarsi, black. Wings deep black; the tegulæ and costa at

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the extreme base, luteous. At the apex of the first submarginal cellule is a large, black horny point.

Length 3¼ lines; alar exp. 9 lines.

Hab.—Brazil.

The antennæ are strongly compressed and only slightly pilose; the head is small, and closely attached to the pronotum, and the front is only slightly carinated.

Trailia nigro-lineata, sp. n.

♀. Pale reddish, the antennæ (except the two basal joints beneath), the head (except the part below the antennæ), and a line on the outer side of the four posterior tibiæ and tarsi, black. Wings blackish, hyaline at the apex, and there is an irregular clear line in the first submarginal cellule; the costa is luteous at the base.

Length 4½ lines; alar exp. 9¾ lines.

Hab.—Bahia.

Comes near to *Hylotoma præcox*, Kl. (also from Bahia), but it is readily known from it by the reddish pleuræ and sternum, the hyaline apex of the wings, and the black-lined tibiæ and tarsi.

The antennæ are a little compressed, and moderately covered with a pale pile. The anterior tibiæ have the extreme apex black on the outside, and the two posterior nearly the whole. The posterior tarsi are black, the anterior only black at the apex. The mandibles are piceous.

RUSOBRIA, gen. nov.

= Klug's, section 4, of *Hylotoma*. Yahrb. p. 245.

Antennæ somewhat compressed, densely covered with long hair. Epistoma keeled. Wings with one marginal (having an appendicular cellule) and three submarginal cellules; the first submarginal cellule long, and it receives a recurrent nervure; the second small, receiving also a recurrent nervure. The lanceolate cellule is contracted, the basal nervure being very short. The posterior wings are as in *Cyphona*. The calcaria are long.

In the form of the antennæ and of the head *Rusobria* agrees with *Trailia*, but differs otherwise in having an appendicular cellule, and in having the lanceolate cellule constricted. The antennæ in the males are forked (*teste* Klug).

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Rusobria megaptera, sp. n.

♀. Shortly pilose, smooth, shining, red; the antennæ, head, the abdomen (except the basal segment), the posterior coxæ, femora and base of tibiæ, the middle coxæ at the apex, a line on the femora, and on the base of tibiæ, black; the tibiæ and tarsi clear white; the apical joint of the tarsi blackish. Wings yellowish; the apical third, and the posterior, except the upper basal and middle parts, black. The nervures (except on the black parts of the wings), costa and stigma, yellow.

Length 4¾ lines; alar exp. 11 lines.

Hab.—Brazil (Swainson).

The antennæ are, properly speaking, fuscous, as is also part of the abdomen; but this is probably owing to the original black colour having faded through age.

Rusobria carinata, sp. n.

♀. Pilose, shining, luteous, the antennæ, the head (except the part below the antennæ), the greater part of the mesonotum, the sternum at the sides and the lower parts of the pleuræ, and the three apical segments of the abdomen, black. Wings hyaline; the basal part, a broad band across the middle from the stigma and the apex, black; the posterior wings are black only at the base and apex. The mandibles are blackish; the stigma, and the costa at the base and apex are also black. The scutellum is yellow. The epistoma is very sharply carinated.

Length 3¼ lines; alar exp. 8 lines.

Hab.—Brazil.

Rusobria leucosoma, sp. n.

♀. Pilose, luteous, the head (except below the antennæ), the greater part of the mesonotum, with the basal half of the scutellum, the apex of posterior tibiæ and tarsi, as well as the two apical segments of the abdomen, black. Wings hyaline, blackish at base and apex; the stigma is yellow; the mouth white.

Length 3 lines; alar exp. 7¼ lines.

Hab.—Amazonia.

Very similar to the preceding species, but smaller; the

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mandibles white; the pleuræ and sternum luteous, the hinder tarsi black; and the wings hyaline in the middle, with only two blackish stripes.

I have to express my indebtedness to my friend Mr. Frederick Smith for the examination of the above-described species, and to Professor Trail for presenting me with *D. sulcicornis* and *T. urcacensis*, both captured by himself.

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XII. *Descriptions of new genera and species of* Cleridæ, *with notes on the genera and corrections of synonymy.* By the Rev. H. S. Gorham.

(*Continued from Trans. Ent. Soc.* 1877, Pt. IV.)

[Read April 3rd, 1878.]

List of New Genera and Species.

Dolichopsis, *nov. genus.*
„ haplocnemodes.
„ cyanella.
Thriocera, *nov. genus.*
Paratillus, *nov. genus.*
„ basalis.
„ analis.
Opilo eburneo-cinctus.
Colyphus limbatus.
Colyphus marginatus.
„ flammeus.
Thanasimus pallipes.
„ pilosellus (Kiesenwetter).
Clerus cylindricus.
„ concinnus.
Stigmatium cinereum.
„ ustulatum.

VI.—CORYNETIDES.

Synopsis of Genera.

A. Prothorax lobed at sides .. .. *Pylus.*
AA. Prothorax rounded at sides.
a. Elytra rough, tomentose .. .. *Prosymmus.*
aa. Elytra smooth, or little hairy.
b. Eyes distinctly cut out.
c. Palpi, apical joint elongate triangular.
d. Elytra widened, club serrate .. .. .. *Corynetes.*
„ „ club simple .. .. *Thriocera.*
dd. Elytra subcylindric .. .. *Paratillus.*
cc. Palpi apical joint oval, truncate .. .. .. *Necrobia.*
ccc. Palpi apical joint cylindric .. .. *Lebasiella.*
bb. Eyes scarcely cut out.
e. Palpi hatchet-shaped at apex .. .. *Notostenus.*
ee. Palpi cylindric, eyes fine,—very small .. .. *Laricobius.*
„ „ „ moderate .. .. *Dolichopsis.*
eee. Palpi acuminate, eyes coarse .. .. *Opetiopalpus.*

Pylus, Newman.

Type, *P. fatuus*, Newm.

Pylus anthicoides, Newm. Entom. 1842, p. 402, G. and H. Cat. p. 1756. This appears to me identical with a species described by M. Chev. [Mém. 1876, p. 42] as

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"*Pilus quadrimaculatus*," but the latter is from "Africa merid.," and I have it myself from South Africa. Possibly the locality of Newman's species, "Port Philip," is a mistake. Anyhow, it seems strange both should have been referred to *Pylus*, from which they differ considerably; the funiculus of the antennæ have the joints 3 — 8 subfiliform, the eyes well cut out, and finely facetted, the pronotum scarcely constricted, and even, and with the sides not lobed, &c. I have, therefore, joined *Anthicoides*, Newm., with *Corynetes pectoralis*, Klug, as a new genus, *Thriocera*.

Pylus bicinctus, Newm. Entom. 1842, p. 364, G. and H. l. c. p. 1756.

This = *Necrobia pinguis*, White, *Cleridæ* IV. p. 63, West. Proc. Zool. Soc. 1852, p. 52. It is not satisfactorily placed here, though undoubtedly nearer to *Pylus* than to *Necrobia*.

The eyes are finely facetted, obviously cut out. The palpi are widened and truncate at their apex, the maxillary pair longer and less triangular than the labial. It will form the type of a new genus.

PROSYMNUS, Castelnau.

Type, *P. cribripennis*, Cast.

NOTOSTENUS, Spinola. [Dej.]

Type, *N. viridis*, Thunbg.

A singularly inapplicable name for the insect now accepted as the type of Thunberg's description, of which the pronotum is depressed, and of equal width with the elytra. *Stenonotum* would be the orthographical term, and is not, as far as I am aware, employed.

DOLICHOPSIS, gen. nov.

Type, *D. haplocnemodes*.

Caput angustum, antice depressum, oculi vix prominentes, paululum excavati, antennæ 11 articulatæ, articulis duobus basalibus robustis; tertio filiformi, secundo sesqui longiore; 4—8 obconicis, tribus ultimis clavam oblongam formantibus. Palpi subfiliformes, apice subacuminato. Pronoto antice angustato, apice recte truncato, basi tenuissime marginato, fortiter punctato,

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haud constricto vel impresso. Elytra subcylindrica apicem versus, modice attenuata, haud striata, punctata. Tarsi, 4-articulati, art. tribus basalibus lamellatis. Unguiculi simplices, basi incrassato.

Dolichopsis haplocnemodes, n. sp.

Viridi-subæneus, elongatus, antice posticeque attenuatus, sparse fortiter punctatus, antennis, palpis tarsisque fusco-nigris, illis funiculo rufo-testaceo.

Long. 3 lin.

Head depressed, with a slight impression on the crown, epistoma produced, subrostrate deeply punctured, eyes moderately granulate, rather more finely facetted than in *Notostenus viridis*. Prothorax with the sides a little rounded and narrowed in front, disk even, convex and very strongly punctate. Elytra a little wider at the base than the thorax, the apical third evenly contracted to the apex, thickly, deeply, but irregularly punctured, punctures confluent. Underside sparingly punctured, pitchy or greenish fuscous. Legs fuscous, tibiæ greenish above. Antennæ with the joints of the funiculus bead-shaped, or little longer than wide (with the exception of the third), the club has the first two joints transverse, the apical one as long as wide, rounded at the apex.

Hab.—Prom. Bon. Spei.; coll. Fry.

Obs.—This species bears a striking resemblance to *Haplocnemus*, Steph., from which, of course, the clavate antennæ, and lamellæ to the tarsi, furnish sufficient distinction.

From *Notostenus*, Spin., the narrow and subcylindric form, less laxly-jointed club of the antennæ, subrostrate head, &c. will remove it.

Dolichopsis cyanella, n. sp.

Cyanea, elongato-oblonga, rugose punctata nitida, pilis nigris erectis sparse vestita, thorace antice angustato, antennis basi apiceque fuscis, articulis 2, 3, 4 testaceis, tarsis fuscis.

Long. 2¼ lin.

Elongate, sides somewhat parallel, but with the head less produced than in the preceding species. Head and thorax distinctly and coarsely punctured, the latter has

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the sides rounded, faintly crenulate, contracted behind and narrowed in front. Elytra closely and deeply punctured, the punctures being frequently confluent transversely, and not striate, suture a little raised. Underside shining, sparingly punctate. Legs fuscous, with a blue tint, tarsi fuscous, first three joints bilobed and lamellate; lamellæ paler fuscous. The antennæ are of moderate length, basal joint stout, blackish, spotted at apex with yellow, the club has the first two joints transverse, the apical one oblong.

Hab.—Prom. Bon. Spei.; coll. Gorham (e Mus. Saunders).

LARICOBIUS, Rosenhauer.

Type, *L. Erichsoni*, Rosenh.

These singular little *Clerids* have much the appearance of *Latridii* or *Corticariæ*. A species in Mr. Fry's collection, possibly identical with *lituratus*, Costa, is from France; but while *L. Erichsoni* is included in the Catalogue of French Col. of M. A. Grenier, Chevrolat, Rev. et Mag. 1874, p. 28, records a nov. sp. as in his collection, from Nice. In his Mémoire, 1876, p. 7, he notices that M. Peragallo had taken *L. Erichsoni* at Nice with quite black elytra; this, I presume, is the same as the supposed n. sp.

LEBASIELLA, Spinola.

Type, *L. lepida*, Klug.

THRIOCERA, gen. nov.

Type, *T. pectoralis*, Klug. [*Corynetes.*]

The species for which I propose this genus is certainly more nearly allied to *Corynetes* than to *Necrobia*, but has a different facies, and the structure of the antennæ, particularly of the apical joint, is very different. In this respect, a second species from South Africa, which I am inclined to join with *pectoralis*, viz. *Pylus anthicoides*, Newm. (= *Pylus* 4 *maculatus*, Chev.) differs still more, the apical joint of this latter being oblong-elongate and equal in length to the two preceding (vide note, sub '*Pylus*,' ante).

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Thriocera pectoralis is a variable species both in size and colour. The eyes are finely facetted, finely setose, and broadly cut out; palpi with the terminal joint elongate, subsecuriform. Antennæ with joints 3, 4 and 5, elongate, especially so in *T. anthicoides*, where they are filiform; the 8th, or joint before the club, is very short in proportion. Of the club itself, the first joint is obconic, but symmetrical (in *Corynetes* the same joint is more acuminate internally); the second subquadrate, faintly obconic; the terminal rounded at the apex, equally compressed throughout, not acuminate on either side, longer than wide, closely applied to the 10th, or joint preceding.

T. pectoralis, Klug, is a black insect with red antennæ and legs, bluish-black elytra, with a central-curved white fascia. Sometimes the base of the elytra are red—this is the type; sometimes only the shoulders are red—this is the form described by Chevrolat as *Clerus scapularis*. (Rev. et Mag. 1874, p. 47.)

T. anthicoides, Newm.; *quadrimaculatus*, Chev., loc. cit., is a yellow insect, with two black patches on each elytron, and the disk of the thorax black. It differs from *pectoralis* in having longer antennæ, and in having coarsely-punctured elytra. Both are from South Africa, Natal, &c.

PARATILLUS, gen. nov.

Type, *P. carus*, Newman [*Clerus carus*, Newm. Entom. 1840, p. 15. Tillus id. G. & H. Cat. p. 1724].

Head with the eyes little prominent, scarcely wider than thorax, excavated, rather finely facetted. Antennæ long, three-jointed club, joints 9 and 10 a little produced triangularly internally; apical, ovate. Thorax faintly margined on the sides, elongate, subdepressed, deeply and sparsely punctulate, with a central elongate fossa. Tarsi four-jointed, basal joint concealed by the second above. Abdomen of six segments.

Hab.—Australia, Tasmania, Nova Caledonia.

I have felt great difficulty in ascertaining the true position of this genus. The tarsi indicate affinity with the latter section of the *Enopliides*, the antennæ and palpi with the *Corynetides*. The species described by Newman appears to vary somewhat. The type form has the head

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black, thorax rusty-red, elytra bluish-black, with a narrow, raised, white, impunctate fascia. My specimens are from Adelaide.

The form from Tasmania has the thorax pitchy-black, excepting at the base; two other forms seem worthy of a distinct name, but may prove to be mere local varieties.

Paratillus basalis, n. sp.

P. cari, proxime affinis, elongatus, nigro-piceus; prothorace, pedibus, antennarum basi, palpis, elytrorumque basi rufo-ferrugineis.

Long. 3—3½ lin.

Distinguished from *P. carus*, Newm., only by the elytra being red at the base, and the remainder being rather more pitchy-black.

Hab.—Moreton Bay; coll. Pascoe and Gorham.

Paratillus analis, n. sp.

P. cari, iterum proxime affinis, elongatus rufo-ferrugineus, nitidus elytris, apice exceptis, pectoreque nigro-subcyaneis, pone medium fasciâ angustâ albâ, antennarum clavâ fuscâ.

Long. 2¾ lin.

Head and thorax as well as abdomen clear ferruginous red. The apex of the elytra indeterminately red, this colour extending further up the suture and sides. Fascia less raised than in *carus*, and with a few punctures; in all three species the base of the tibiæ is darker than the rest of the legs.

Hab.—Nova Caledonia; coll. Gorham (Saunders).

With regard to *Tillus bipartitus*, which formerly I was inclined to think would belong to this genus [vide "Cistula Ent.," 1876, p. 62], a further examination has convinced me it should form a new genus near *Thanasimus*.

CORYNETES, Herbst.

Type, *C. cæruleus*, De Geer.

Differs from *Necrobia*, not only in the structure of the antennæ and palpi, but as Thomson points out (Skand. Col. x. 119—120), the eyes are hairy; though it can scarcely be said they are glabrous in *Necrobia*, short setæ being just visible.

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Corynetes abdominalis, Fab. G. and H. Cat. p. 1757; considered as synonymous with his *pallicornis* by Spin. (ii. 96), though apparently differing in having the *whole* abdomen red. Specimens which I refer to this species in Mr. Fry's collection from Natal have *two* segments at the apex of the abdomen pale red. Hence I imagine *C. abdominalis*, Fab., *analis*, Klug, and *pallicornis*, Sp., will prove to be one species.

Corynetes ovatus, Spin. (Gay, Hist. Chil. iv. 411).

This little species varies from testaceous, with a minute black shoulder spot, to ferruginous red, with the disk of the thorax, elytra (the margin and an apical vitta yellow) and underside of the breast and abdomen black. It is of doubtful location, the eyes are scarcely emarginate, small and prominent, the sides of the thorax crenulate.

I suspect the yellow specimens (which are rather larger) to be a distinct species.

Corynetes pectoralis, Klug, G. and H. Cat. 1758 = *Thriocera*, Gorh., q. v. ante.

Corynetes mysticus, Bohem. From the description, probably congeneric with *pectoralis*, but I have not seen it.

NECROBIA, Latreille.

Type, *N. ruficollis*, Fab.

Necrobia aspera, Newman, G. and H. Cat. p. 1758, is simply *N. rufipes*, Fab.

N. glabra, Champollion, G. and H. loc. cit.—a nondescript insect, perhaps not pertaining to this family.

Necrobia eximia, White, Cler. p. 63, belongs to the *Clerides*, having five joints to its tarsi, the labial palpi only securiform, and the apical joint of the antennæ falciform. In brilliancy of colour it resembles *Aulicus sculptus* (cf. Cistula, 1876, p. 84), from which, however, it may at once be distinguished by being almost glabrous. It is best associated with *Thanasimus*, as placed in the Munich Catalogue. The type is in my own collection, from that of Mr. Saunders.

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OPETIOPALPUS, Spinola.

Type, *O. scutellaris*, Panzer.

Opetiopalpus morulus, Kiesen. (in lit.). I think this species, found by Mr. G. Lewis, in Japan, at Nagasaki, will prove identical with *O. obesus*, White (Westw.).

APPENDIX A.

Tillus Lewisii (Kiesenwetter, *in lit.*)

I think this is probably *notatus*, Klug, but having never seen an authenticated specimen of the latter I am unable to say certainly. The antennæ have three joints at the base, and a portion of the fourth testaceous. The thorax red, with a large triangular black spot occupying the front margin, and its apex in the centre of the disk. Base of the elytra and breast red, a white fascia below the middle, narrowly connected with the basal red, at the suture, by the extension of the yellow, which there margins it. Thighs pitchy, tibiæ and tarsi red.

Hab.—Nagasaki (G. Lewis).

I have a specimen from Laos (Mouhot), which agrees with this, in the exception of having a pale spot near the apex. One from Mysol (Wallace), has the black rather more extended on the sides of the thorax, and the apex of elytra white, and is, I believe, identical in other respects.

Opilo eburneo-cinctus, n. sp.

Niger, nitidus, ore, antennis, palpis, pedibusque piceis; thorace parce punctato, medio profunde sulcato, antice transversim impresso; elytris prope basin rubro-tinctis, fasciâ medianâ angustâ, paululum elevatâ, albâ; usque ad fasciam grosse subseriatim punctatis, hinc inde fere lævibus.

Long. 3 lin.

Allied to *O. Pascoii*, Gorh. (Cist. Ent. 1876, p. 71), but smaller, and differing from it in the breast not being red, in the *raised* and unpunctured white fascia, &c. It also somewhat resembles *Paratillus basalis*, but cannot be confused with that genus if the structure of the thorax and the strongly securiform palpi are noticed.

Hab.—New South Wales; coll. Pascoe.

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Colyphus limbatus, n. sp.

Niger, nitidus, capite antice, palpis, prothorace subtus, coxis et femoribus pallide flavis; elytris nigro-cyaneis, crebre punctatis, pube brevi micante vestitis albo-marginatis; pronoto lævi, oblongo-quadrato, antice transversim impresso, margine antico utrinque albo-notato.

Long. 3¼ lin.

Head and thorax of equal width, epistoma and mouth yellow, tip of the mandibles and of the palpi black. Antennæ black, but the basal joint with a yellow line beneath. Thorax longer than wide, the sides between the anterior constricted line, and the depressed and constricted portion of the base, rounded; a whitish spot on each side the front margin continued round the anterior angles. Elytra a little wider than thorax, sides parallel, very slightly widened towards the apex, subdepressed, bluish-black, with a violet tinge, very narrowly margined from the shoulder to apex with yellowish-white, this margin is of even width. Legs pitchy, femora, with the exception of the extreme tip, pale yellow.

Hab.—Venezuela [Thieme].

This species, which appears to agree with the general characters of Spinola's genus *Colyphus*, was sent me by M. R. Oberthur, who remarks that it appears to vary a good deal in the colour of the thorax, and the suture of the elytra.

With respect to the genus *Colyphus*, the characters by which Spinola has separated it from *Systenoderes* are unsatisfactory, the differences given in the text (pp. 131, 134) may be summarized as lying in the form of the body and prothorax; and that *Colyphus* has well-developed appendices to the tarsi, while *Systenoderes* has the two first with rudimentary plates beneath, and the claws without teeth; yet in the Plate V., fig. 5, *Colyphus* is shown with enlarged tarsus, *without* plates to the two basal joints; while, according to my observation, *Systenoderes umænus* has claws with a dentiform enlargement of their base, much as shown in the same plate. The fact is, these subdivisions of the genus *Cleronomus* are dependent on nothing further than the form and general appearance of the body. They may, perhaps, be useful, as the species are distributed from Venezuela to Montreal, if we include *thoracicus*, Say. *Colyphus limbatus* has well-developed lamellæ to the first four joints of the tarsi, the claws

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simply thickened at the base, the joints of the antennæ gradually shortened, and acuminate internally to the tenth, the apical one twice as long and compressed, a little falciform, all the joints laxly articulate.

Colyphus marginatus, n. sp.

Niger, capite thoraceque nitidis, hoc lateribus, illo epistomate flavis, elytris subopacis crebre fortius punctatis, fumeis, vittâ submarginali flavâ.

Long. 3¼ lin.

Head very shining, impunctate, tips of mandibles black, palpi touched with dusky; thorax quadrate, strongly constricted in front, base margined, the entire sides widely yellow, disk depressed, shining, very obsoletely punctured. Elytra dull smoky-black, closely and confluently punctured, a yellow vitta of even width runs from the shoulder to the apex, leaving the margin narrowly dark; the suture is very narrowly yellow in the middle. Legs black, trochanters yellow.

Hab.—Mexico; in my own collection (Saunders).

Colyphus flammeus, n. sp.

Niger, capite thoraceque nitidis, hoc lateribus et infra, illo epistomate testaceis; elytris aurantiacis, apice late margine reflexo, et regione scutellari nigris.

Long. 3¼ lin.

Of the size and form of *C. marginatus;* antennæ black, joints 6—10 triangular, about equal in length, acuminate internally, apical compressed, acuminate. Thorax quadrate, deeply impressed with a constricted line in front, between which and the base the sides are tumid and rounded. Elytra subopaque, thickly and finely punctured, with the exception of a third at the apex, a scutellar patch, and the limb narrowly; they are of a rich orange-yellow, paler internally.

Hab.—Mexico. In my own collection (Saunders).

Obs.—Both this and *marginatus* might be referred to Chevrolat's genus *Derestenus*, which appears to me to differ only in having the antennæ subserrate, without any distinct club.

Thanasimus pallipes, n. sp.

Nigro-piceus, nitidus, antennarum basi, palpis, pedibus, elytrorumque maculis quatuor magnis pallidis; elytris

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obsolete punctato-striatis pube depressâ parce vestitis, tibiis anticis et intermediis basi, posticis totis, tarsisque piceis.

Long. 1¾—2 lin.

Head deeply inserted in the thorax, eyes coarsely granulate, scarcely emarginate, antennæ more than half the body's length, club fuscous, terminal joint elongate, apical portion pale and acuminate. Thorax short, transverse widest in the middle, much narrowed behind, base finely constricted, transversely impressed in front. Elytra nearly twice as wide as the thorax, humerus and base pitchy, as well as a broad central fascia, the entire margin and suture being of the same colour; hence, leaving on each two roundish pale spots, somewhat irregular in shape, the anterior of which is largest; there are about nine striæ on each elytron, impressed with large, but obsolete punctures, which are also irregular in form; they are also clothed with long hairs, and a few more erect setæ. Legs pale whitish-yellow; all the tarsi, the knees of the anterior and middle pair, and the posterior tibiæ, pitchy-brown.

Allied to *T. anthicoides*, Westwood, apparently rather larger, and differing in the colour of the legs, &c.

Hab.—Philippines: Bohol, Luzon (Semper).

Thanasimus pilosellus (Kiesenwetter, *in lit.*), n. sp.

Elongatus, subparallelus, niger, elytrorum dimidio basali fasciâque subapicali, rufo-piceis antennis pedibusque nigro-piceis; his tibiis, illis funiculo dilutioribus; capite thoraceque nitidis.

Long. 2¾ lin.

Head and thorax shining, almost impunctate, eyes finely granulate, cut out, the incision clothed with shining yellow hairs; antennæ of moderate length, gradually thickened, so that the last four or five form a lax club; the basal joint and club dark; the intermediate pitchy-red. Thorax about as long as wide, sides rounded, at the widest part as wide as the eyes, constricted above the middle, the base margined; the disk is rather uneven below the constricted line, and deeply impressed on each side. Elytra a little wider than the head and thorax, sides parallel subrugosely punctate-striate, the striæ and punctures continued to the apex. The whole upper surface is here and there clothed with erect black setæ, the elytra have the basal half rusty-red, intersected by an indistinct

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darker fascia; their apical half pitchy with an ill-defined reddish fascia, and the apex itself of this colour, these parts having yellow shining hairs. Legs pitchy, tibiæ rusty-red.

This insect bears some resemblance to *Thanasimus bipartitus*, Blanch., but does not attain the size of the larger examples of that species.

It was discovered by Mr. G. Lewis at Nagasaki, Japan. I have preserved the name by which it was returned by Herr Kiesenwetter, who has described the Japanese Malacodermata, but who, I believe, has not described any *Cleridæ* from Japan.

Thanasimus rufimanus, Gorh. (Cist. 1876, p. 74) = *Aulicus chrysurus*, Chev. (Rev. et Mag. 1874, p. 48).

Aulicus ochrurus, Chev. (Mém. 1876, p. 16 = *Aulicus albofasciatus*, Gorh. (Cist. 1876, p. 85). M. Chevrolat's Mémoire bears the date "15 Mars, 1876." I may remark, however, that the note upon the title page implies that it was the end of 1876 before it was in the hands of the public. My own paper was published in August of the same year.

Clerus vulpinus, Gorh. (Cist. 1876, p. 81) = *Clerus mexicanus*, Cast. (Rev. Silb. iv. 44).

Clerus Silbermanni, Chev. (Mag. Zool. 1843, p. 21), *Clerus assimilis*, Chev. (l. c. p. 17), *Clerus semiochraceous*, Chev. (Rev. et Mag. 1876, p. 41), *Clerus Boucardi*, Chev. (Mém. 1876, p. 13). These all appear to me to be mere varieties of *C. mexicanus*, Cast.

Clerus cylindricus, n. sp.

Nigro-fuscus, cylindricus, antennis (clavâ fuscâ) palpis, pedibusque rufis; elytris rufo-piceis guttâ basali, annuloque in singulis ante apicem flavis.

Long. 3½ lin.

Head fuscous, labrum testaceous, mandibles black. Thorax oblong, faintly but thickly punctured, fuscous shining, anterior margin rufous, subpilose. Elytra thickly obsoletely punctate, shining sparsely pubescent, mottled with yellow and brown, all the markings ill-defined and probably subject to more or less diffusion; underside fuscous, legs pale rufous.

Hab.—Guatemala (alt. 5,000 ft. Salvin).

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Clerus concinnus, n. sp.

Niger, thorace crebre subtiliter punctato, postice attenuato; elytris basi fulvo-tinctis, juxta scutellum tuberculo atro-piloso instructis, medio anguste flavo-fasciato, antennis articulis duobus basalibus, ore, tarsisque testaceis.

Long. 2 lin.

Smaller than any other species of this genus known to me, and probably not truly belonging to it; the terminal joint of the antennæ is quadrate, compressed, not acuminate; the prothorax is rather shining near the base, and is there raised into an elongate tubercle.

Hab.—Guatemala, Chinautta (alt. 4,100 ft. O. Salvin).

Stigmatium cinereum, n. sp.

Cinereo et fusco variegatum; thorace, capite elytrisque angustiore, æneo-sericeo, medio indistincte carinato, antice et postice concinne constricto; antennis basi apiceque testaceis, pedibus pallidis, femoribus et tibiis fusco-annulatis, genubus etiam fuscis, tarsis rufis.

Long. 3—3½ lin.

A species forming a link between *Omadius* and *Stigmatium*, the structure of the thorax and coloration of the legs being rather that of the former, while the width of the space between the eyes leads me to place it in the latter. The head is testaceous in front and in the ocular sinus, while the crown and space between the eyes is ashy-grey, eyes large; thorax nearly parallel, bronzed, shining. Elytra with the humeral angles right, narrowed to apex, which is subacute, punctate-striate for half their length, thickly clothed with ashy scales and darker spots, the principal of which form an undulate central fascia; subcostate in the middle with the sutural region flattish; this character, with the brassy-looking thorax, will best distinguish this species from any other known to me. It is not easily to be compared to any other, yet the differences, especially in the marking, are hard to express.

Hab.—Dorey, New Guinea (Wallace), Andaman Isles; coll. Fry and Gorham.

Stigmatium ustulatum, n. sp.

Nigro-piceum, nitidum, thorace elongato, antice et postice constricto, disco inæquali, medio carinato, elytris fasciâ medianâ, alterâque ante apicem latiore argenteo-

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sericeis, basi rufis fortiter punctato-striatis, pedibus anterioribus et intermediis rufis nigro-tinctis, posticis nigris.

Long. 5½ lin.

A very distinct species, in colour a little like *mutillæcolor*, White, but narrower, parallel, and in form resembling *Omadius*. Head black, labrum pale yellow, crown obsoletely punctured and wrinkled. Thorax black, shining, without scales, carinate below the anterior constricted line, and having a broad oblique fossa on each side the carina, hence the disk appears to have about four tubercular callosities. Elytra red at the base as far as the first fascia; externally however, this is bordered with brownish-black above. The fasciæ are of whitish silky down on a red ground, the intermediate space and apex being black, without scales or hairs. Antennæ black, two basal joints yellow. Palpi yellow, apical joints fuscous. Legs, two front pairs rufous stained with pitchy, hind pair black, tarsi fuscous at base, red at apex; trochanters red.

Hab.—Borneo, Sarawak (Wallace). In my collection.

Appendix B.

A list of *Cleridæ* collected by Herr Semper in the Philippine Islands:—

Cylidrus cyaneus, Fab., E. Mindanao.

Tillus Semperanus, Gorh. (Cist. Ent. 1876, p. 62), Bohol.

Gastrocentrum, pauper, Gorh. (Cist. Ent. 1876, p. 63), Luzon.

Callimerus gratiosus, Gorh. (Cist. Ent. 1876, p. 66), E. Mindanao.

Callimerus pulchellus, Gorh. (loc. cit. p. 67).

Callimerus insolatus, Pascoe (Gorh. l. c.), Luzon, E. Mindanao.

Callimerus latifrons, Gorh. (l. c. pp. 67, 68).

Opilo mollis, L., Bohol and Luzon.

Thanasimus anthicoides, Westwood, Bohol, Luzon, &c.

Thanasimus pallipes, Gorh., Appendix (Trans. Ent. Soc. 1878, ii. p. 162).

Stigmatium encaustum, Gorh. (Cist. Ent. l. c. p. 93), Bohol.

Stigmatium Philippinarum, Gorh. (l. c.), Luzon.

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Stigmatium subfuscum, Gorh. (l. c. p. 94), E. Mindanao.

Stigmatium centrale, Gorh. (l. c. p. 94), E. Mindanao, N. E. Luzon.

Stigmatium tapetum, Gorh. (l. c. p. 95), Mindanao.

Omadius aurifasciatus, Gorh. (l. c. p. 102), E. Mindanao.

Omadius nimbifer, Gorh. (l. c.), E. Mindanao, Luzon.

Omadius vespiformis, Gorh. (l. c. p. 103), E. Mindanao.

Omadius notatus, Gorh. (l. c.), E. Mindanao.

Omadius posticalis, Gorh. (l. c. p. 105).

Tenerus Mindanaonicus, Gorh. (Trans. Ent. Soc. Lond. 1877, iv. 407), Mindanao.

Necrobia rufipes, F., passim.

Necrobia ruficollis, F., Zamboanga.

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XIII. *Remarks on the hairs of some of our British* Hymenoptera. By EDWARD SAUNDERS.

[Read March 6th, 1878.]

(Pl. VI.)

I HAVE recently been examining rather closely some of our British aculeate *Hymenoptera*, and have been much struck with the varieties which appear in the structure of their hairs, and as I do not see that any detailed account has been given by any one of these peculiarities, I propose to give the result of the observations that I have made. I know that Reaumur, Mr. Frederick Smith, and others have noticed the existence of plumose hairs on some of the species, but I cannot find that the different variations have anywhere been brought together in a special notice like the present, which I think they deserve. I hoped at first, from the well-marked character of these variations, that they would have been useful in the classification of the genera, &c.; but although the presence of branched or plumose hairs seems to characterize the section *Anthophila*, and to divide it naturally from its allies, yet so far I have found no characters which will serve for further divisions within the section, notwithstanding the great diversity in the structure of the hairs themselves, and also in their relative positions on the insects. I have now examined the hairs of one or more species in almost all the genera of our British *Aculeates*, and find that in the *Heterogyna*, the *Fossores* and the *Diploptera*, they are all simple, or in some cases twisted, whereas in the *Anthophila* plumose or branched hairs may always be found, although sometimes mixed with simple ones. This rule holds good even in genera like *Prosopis*, *Ceratina*, &c., where the insects have scarcely any hairs, still what there are, maintain the character of the family in being branched or plumose.

As a rule, the most beautifully-branched hairs may be found round the posterior sides of the metathorax, but in some genera, such as *Macropis*, *Dasypoda*, and in some species of *Andrena*, they occur on the scopæ of the hind legs, and in *Chelostoma* are found on the pollen-brush of the body. The diversity in the shape of the pollen hairs

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is very striking, for, in some species they are simple, in others rigid and branched, in others rigid, straight and spirally grooved, in others branched and flexuous; and these different styles of pollen hairs occur in species the metathoracic hairs of which may be almost identical: for instance, in *Megachile*, *Osmia* and *Chelostoma* the hairs of the metathorax are very similar, but in *Megachile* the pollen-brush of the abdomen is composed of beautifully rigid spiral hairs; in *Osmia*, of simple ones; whereas in *Chelostoma* they are long and flexuous, with branching filaments.

The following varieties of hairs, I think, may be easily distinguished:—

1st. Simple hairs occurring occasionally on various parts of the body and on the scopæ of some species of *Andrena*, &c., and the pollen-brush of *Osmia* and *Anthidium* (fig. 1).

2nd. Simple hairs, with a slight swelling above the base, occurring on the scopæ of *Andrena albicans*, ♀, &c. (fig. 2).

3rd. Rigid, straight, spinose hairs, spirally grooved, forming the pollen-brush of *Megachile*, post tibiæ of *Andrena albicans*, ♂, &c. (fig. 3).

4th. Serrate or very shortly-branched hairs (to be found on the thorax and body of most of the species), the apices of the branches in the hairs of the scopæ of *Dasypoda*, ♀, are more or less clubbed (figs. 4, 16).

5th. Hairs with long branches (to be found in every variety—the most beautiful round the metathorax of *Colletes*, *Eucera*, *Apis*, &c.) (figs. 5, 6).

6th. Rigid, somewhat spinosely-branched hairs (scopæ of *Macropis*, &c.) (fig. 7).

7th. Long flexuous hairs, with branching filaments (pollen-brush of *Chelostoma*, floccus of *Andrena*, &c. &c.) (figs. 8, 9).

8th. Somewhat rigid hairs, with one or two short tooth-like branches near the apex or with several branches mostly projecting on one side, sometimes almost fan-shaped (tibiæ of ♂ and ♀ *Andrena albicans*, *Colletes cunicularia*, and most of the *Andrenidæ* (figs. 10, 11, 12, 12*a*).

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9th. Somewhat spirally-grooved hairs, dilated and flattened at the extremity, sometimes very short (on the inner side of the hind tibiæ of *Andrena*, *Megachile*, &c.) (fig. 13).

The interesting question now remains as to what the use of these peculiar hairs can be. If my observation is correct that they exist only in the *Anthophila*, then I think there is a strong inference that they are of some use in the collecting of pollen, although they equally occur on the parasitic bees, such as *Nomada*, &c. It is also remarkable that the parts specially adapted for collecting pollen should bear such differently-shaped hairs in various species. Thus the pollen hairs of the brush of *Megachile*, with their long spiral shapes, would hardly seem to be useful for the same purpose as the flexuous and branched ones of the brush of *Chelostoma*. Still we know that it is by means of these brushes that they carry home most of their pollen, and no doubt in some way each species finds its own brush especially serviceable. What I should much like to find out is, whether the species that frequent the same flowers have similarly-formed pollen hairs. I have been trying to arrive at this by the examination of the pollen grains on the hairs, but in many cases I find two or more kinds present, and my knowledge of their shapes is not sufficient to know what species they belong to. They seem to stick to the hairs anywhere, sometimes on the sides, and sometimes on the points of the branches. I hope that by further study of this subject the uses of these characters may be arrived at, as I feel sure they must in some way play an important part in the economy of the insects under consideration.

I have found a quarter-inch power the most useful for examining the hairs.

Since reading the foregoing, I have noticed that the hairs on the scopæ of the ♀s of the *Andrenidæ* seem to be arranged on a definite plan, and that this arrangement is similar in all the species. The outer side of the tibiæ is covered with simple, or in some cases branched, hairs, such as those figured in figs. 4 or 7; the inner side, or side towards the body, is covered with spiral hairs with dilated apices, like those in fig. 13; between the sides, on the edges, is a series of hairs, such as those figured 10, 11, 12, 12*a*, varying much according to the species. The arrangement of the hairs on the tarsi seems to be somewhat similar.

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EXPLANATION OF PLATE.

Fig. 1. Simple hair.

2. Hair, with slight swelling near the base, as found in scopæ of *Andrena albicans* ♂.

3. Straight spiral hair, stomach of *Megachile argentata.*

4. Ordinary plumose hairs off *Megachile maritima*, found also on the metathorax and body of many species.

5. Branched hair, metathorax of *Colletes cunicularia.*

6. Do. do. *Colletes succincta.*

7. Do. scopa of *Macropis labiata* ♀.

8. Hair, with filamentary branches; pollen-brush of *Chelostoma.*

9. Do. tuft on metathorax of *Andrena dorsata.*

10. Hair, with branches on one side only, off scopa of *Andrena Afzeliella* ♀.

11. Do. do.

12. Rigidly-branched hair from scopa of *Colletes cunicularia* ♀.

12*a*. Do. do.

13. Spiral hair, with flattened and dilated apex, off inner side of scopa of *Andrena varians.*

14. Metathoracic hair of *Prosopis communis.*

15. Scopa hair of *Cilissa leporina* ♀, showing pollen grains adhering.

16. Portion of a hair off scopa of *Dasypoda hirtipes* ♀, showing the club-shaped ends of the branches.

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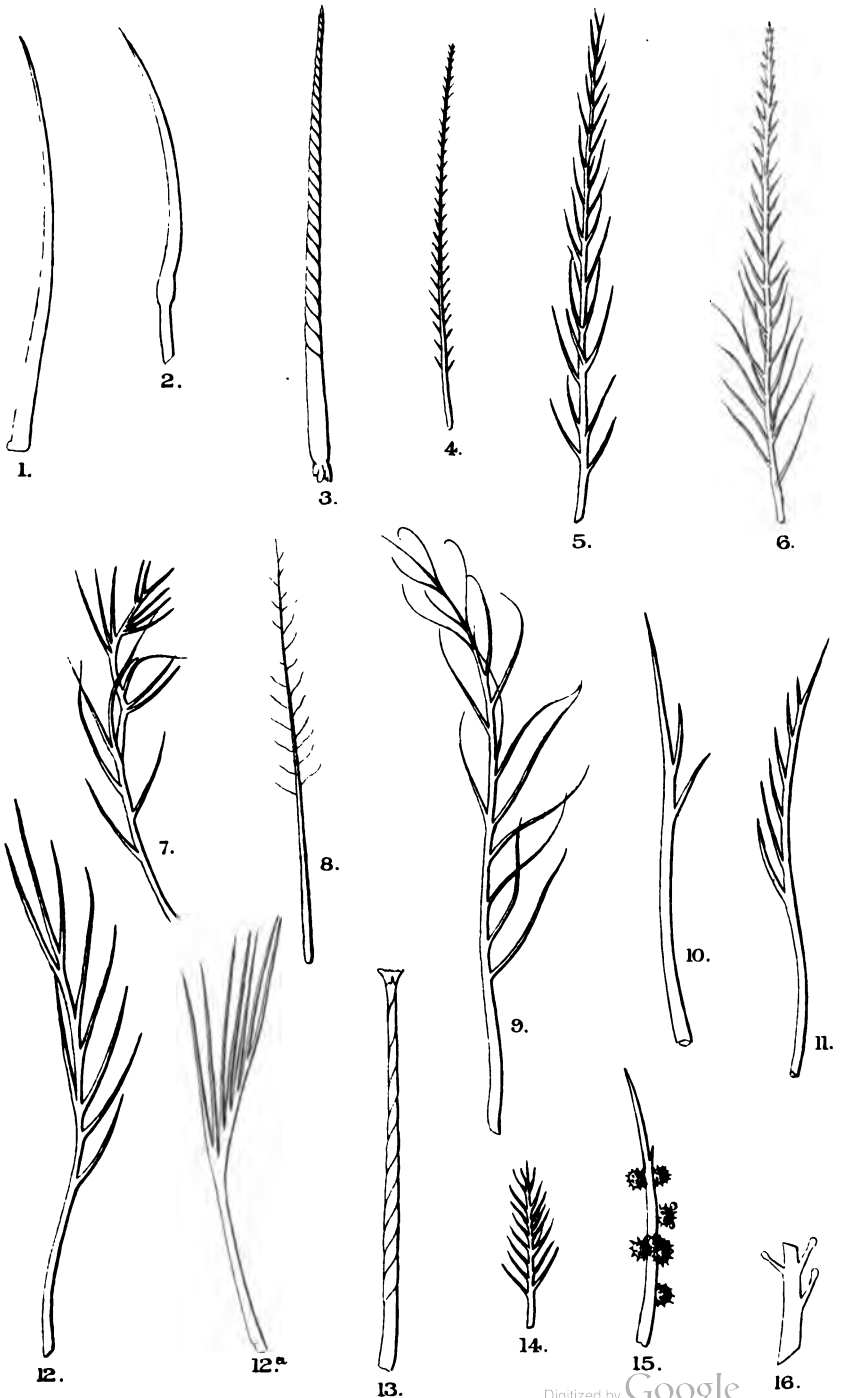

R Mintern lith.

Mintern Bros imp.

Hairs of Hymenoptera.

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XIV. *Notes on some* Hemiptera-Homoptera, *with descriptions of new species.* By W. L. Distant.

[Read May 1st, 1878.]

The following descriptions of a few Homopterous insects, belonging to the families *Stridulantia* and *Cercopina*, may, perhaps, be best introduced by a few remarks concerning the geographical distribution of the latter. It would, indeed, be difficult to find a better example of the uncertainty of all generic calculations as to geographical distribution than is afforded by the family *Cercopina*.

Fabricius included all the *Cercopina* in the genus *Cercopis*, which would thus exhibit almost a world-wide range. Germar, in 1821, separated this into two great divisions, *Cercopis* and *Aphrophora*, with the first of which we will now only deal. In 1839, Burmeister included in *Cercopis* insects which were common to Java, Asia, Europe, Central America and Brazil. In 1843, Amyot and Serville restricted *Cercopis* to insects which, as then known, were common only to Java, China and the islands included in the Australian region, and instituted the genera *Tomaspis*, *Rhinalaux*, *Triecphora*, *Monecphora* and *Sphenorhina*; the genus *Tomaspis* being restricted to insects from South and Central America. In 1866, Stål had sank the genera *Triecphora*, *Monecphora* and *Sphenorhina*, and placed them in the genus *Tomaspis*, under which he had also described insects from Africa and the Indian and Malayan region, thus giving the genus a home in the Neotropical, Ethiopian and Oriental regions. In 1870, however, Stål founded his genus *Phymatostetha*, which included all the Eastern species of *Tomaspis* he had described, and so the last-named genus now only includes representatives from the Neotropical and Ethiopian regions. As for the genus *Cercopis*, it is now almost lost in the genera *Cosmoscarta* and *Phymatostetha*. I think any entomologist who considers these facts will acknowledge how empirical it is to draw great conclusions in geographical distribution from generic calculations alone.

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STRIDULANTIA.

Genus PLATYPLEURA, Amyot and Serville.

Platypleura andamana, n. sp.

Tawny, pubescent. Face moderately convex, transversely sulcated, with a deep central longitudinal furrow; luteous, with two short black basal lines on each side of vertex. A narrow black fascia, extending from eye to eye, immediately in front of ocelli. Eyes brilliant, castaneous, broadly pilose behind. Pronotum deeply furrowed, with frontal edge and two small foveæ, placed close together near centre of hind border, pitchy. Mesonotum, with two large obconical spots, extending backwards from fore border, midway between which there is a discal dart-shaped mark, and two dots wide apart near hind border, black; there are also two other somewhat obscure black marks situated on fore border on outer sides of the large obconical spots. Metathoracic cross, with its fore borders, pitchy. Abdomen above with segmental sutures black, clothed with luteous pubescence; anal appendage pitchy, castaneous. Underside with legs ochraceous. Rostrum extending to second abdominal segment; its tip, two spots on the sixth abdominal segment, knees and tarsi, piceous.

Tegmina dark brown, with pale semi-opaque markings, especially on the apical half. Basal third thickly covered with pale pubescence, and containing five dark-brown spots, of which the most prominent are two which are subcostal, situated beyond the medium of this space, and a third one below the basal of those two spots. Remainder of tegmina less pubescent, with a number of whitish spots, of which the most prominent are a transverse row stretching across from near costa to inner border, immediately beyond the basal third pubescent space; another more waved row beyond middle confluent near costa, *where they are very visible below;* a subapical marginal row of five whitish oblong spots, arranged on the nervures of which the apical ends are dull brown; and an outer marginal row of six dark-brown spots, also arranged on the nervures of which the lowest is the largest; a dull whitish fusiform spot on inner angle, which is *very distinct on underside.* Wings castaneous, with a dark-brown marginal border, and some suffused dark-brown discal streaks extending across the wings.

♀. Long. 22 mill.; exp. tegm. 84 mill.

Andaman Isles.

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This species is allied to the Madagascar form, *P. guttulata*, Sign.; the tegmina are, however, much narrower and much less arched on the costal edge near base, the lateral edges of the thorax differ in being pointedly acute, the rostrum is longer, ground colour much darker and markings different, though the general pattern is much followed.

Genus Tosena, Amyot and Serville.

Tosena albata, n. sp.

General colour and markings of *T. melanoptera*. White; but tegmina with five longitudinal whitish fasciæ situated between the veins commencing near base, two of which amalgamate with the broad central transverse band, and a subapical row of five irregular longitudinal fasciæ of the same colour, the first of which is placed at about one-third the length of outer border from the apical point of tegmina, and the last is fused into the central band near the inner margin. Wings as in *T. melanoptera*, but with a submarginal row of nine whitish fasciæ, commencing near costa, of which the seventh and ninth are the largest, the last very much so; two-thirds of the outer border narrowly edged with the same colour.

♂. Long. 59 mill.; exp. tegm. 132 mill.

N. W. Himalaya.

This species is also smaller than *T. melanoptera*, with the tegmina narrower and rostrum quite reaching the first abdominal segment, which is not the case in the males of that species. The apices of the femora are not luteous.

CERCOPIDA.

Genus Cosmoscarta, Stål.

Cosmoscarta andamana, n. sp.

Sanguineous, thickly and finely punctured; tegmina, with a broad band across centre and apex broadly, black: these bands are united at inner margin, in some specimens very broadly so. Wings sordidly hyaline, with the veins much darker; base slightly sanguineous. Femora, tibiæ and tarsi, piceous, hind tibia armed with an acute spine.

Long. 9 mill.; exp. tegm. 24 mill.

Andaman Isles.

Allied to *C. heros*, Fab., with which, however, it cannot be confused.

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Genus TOMASPIS, Amyot and Serville. Stål. Hem. Af. iv. p. 56.

A. *Posterior tibiæ armed with two spines.*

a. *Spines long, robust.*

Tomaspis modesta, n. sp.

Fuscous, shining; head, pronotum and scutellum somewhat coarsely punctured, tegmina very thickly and finely punctured. Face convexly tumid, somewhat obscurely transversely sulcated with central keel very distinct, pale fuscous. Head rounded in front, ocelli prominent. Head, pronotum, scutellum and underside of body dark fuscous. Lateral edges of thorax above and below with legs, pale fuscous. Abdomen above dull reddish. Wings sordidly hyaline. Posterior tibiæ armed with two strong spines.

Long. ex. tegm. 10 mill.; exp. tegm. 29 mill.

Mongo-ma-lobah, W. Africa.

Tomaspis Monteironis, n. sp.

Black, shining, thickly and finely punctured; abdomen, femora and rather more than basal half of tibiæ, sanguineous. Lateral borders of abdomen beneath, with a segmental row of large quadrate black spots. Face robustly and convexly tumid, distinctly transversely sulcated; central keel faintly indicated. Pronotum with two small obscure intra-ocular depressions near fore border, behind which are two transverse and somewhat deflected striæ. Wings sordidly hyaline, bases of wings above, and wings and tegmina below narrowly sanguineous. Posterior tibiæ armed with two strong spines.

Long. ex. tegm. 9 to 10 mill.; exp. tegm. 23 to 26 mill.

Delagoa Bay (Monteiro).

Tomaspis conspicua, n. sp.

Black, shining, thickly and finely punctured; tegmina with a large central oblong sanguineous spot. Abdomen and legs dull reddish; apices of tibiæ and tarsi piceous. Face robustly and convexly tumid, distinctly transversely sulcated, central keel faintly indicated. Pronotum with two intra-ocular distinct rounded impressions near anterior border, behind which are two transverse somewhat deflexed striæ. Wings sordidly hyaline, bases of wings

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above, and of wings and tegmina below, dull reddish. Posterior tibiæ armed with two strong spines.

Long. ex. tegm. 10 mill.; exp. tegm. 26 mill.

Nyassa.

As may be seen from the above description, *T. conspicua* is closely allied to *T. Monteironis*, from which, however, it can be easily distinguished, not only by the prominent spot on the tegmina and the absence of the spots on the lateral abdominal edges below, but also by the following structural characters. The pronotum is broader and more convex, and the frontal borders of the scutellum very much more raised and distinct. The sculpture of the upper surface of the head is also different.

aa. *Upper spine of posterior tibiæ small, obscure.*

Tomaspis binotata, n. sp.

Black, shining, thickly and finely punctured. Scutellum somewhat transversely strigose. Tegmina with a median irregularly-rounded spot situated at about two-thirds the length from base, and a larger, somewhat fusiform claval streak commencing at base, bright fulvous. Head rounded in front. Face convexly tumid, faintly and transversely sulcated, keel distinct. Eyes fulvous. Legs obscure, livid. Wings sordidly hyaline. Posterior tibiæ armed with two spines, the upper one of which is very small and obscure.

Long. ex. tegm. 9 mill.; exp. tegm. 23 mill.

Isubu, W. Africa.

B. *Posterior tibiæ armed with one spine.*

Tomaspis nyassæ, n. sp.

Black, shining, thickly and finely punctured, pronotum with traces of a central longitudinal impression, which appears as an elevated ridge at base. Corium, with a submedian oblique fascia, extending from about costal edge to claval suture, where it is somewhat narrowed, an apical transverse fascia semicircular in shape, rounded externally and profoundly dentated about the centre, almost extending from costa to inner margin, and a large streak, which, commencing at base, occupies about one-half of the claval area, sanguineous. Abdomen, excepting apex, legs, rostrum, excepting base, sanguineous. Wings sordidly

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hyaline, with the base narrowly sanguineous. Eyes pale fulvous. Face convexly tumid, transversely and distinctly sulcated, central keel distinct and prominent. Posterior tibiæ armed with one spine near apex.

Long. ex. tegm. ♂ 15 mill.; exp. tegm. ♂ 38 mill.
„ ♀ 18 mill. „ ♀ 42 mill.

Nyassa (Simon).

The ♀ is much less brightly coloured than the ♂.

Genus Sphenorhina, Amyot and Serville.

Dr. Stål has included in the genus *Tomaspis* the genera *Triecphora*, *Monecphora* and *Sphenorhina*. I quite agree with him in sinking the two first named, but the last seems so well marked a genus, and one so easily recognized, that I consider it at least convenient to retain it.

Sphenorhina distincta, n. sp.

Black, shining, thickly and finely punctured. Head, thorax and scutellum slightly pilose. Reticulated portion of tegmina somewhat ferruginous, corium black, shining. Abdomen and posterior legs (tarsi excepted, which are black), sanguineous. Wings obscure hyaline, somewhat fuscous at outer borders. Posterior tibiæ armed with a strong spine; scutellum large, transversely striated.

Long. ex. tegm. 6 mill.; exp. tegm. 18 mill.

Irazu (Rogers). 6-7,000 ft. Coll. Godman and Salvin.

This species is somewhat allied to *S. metallica*, Walk.

Sphenorhina plagiata, n. sp.

Testaceous; thorax black, with the anterior and lateral edges and a transverse central band testaceous. Eyes luteous. Pectus and abdomen black, the last with the posterior segmental edges and the anal appendage obscure testaceous. Legs testaceous, with a pitchy streak on femora, commencing at base. Pronotum and tegmina thickly and finely punctured. Wings obscure hyaline. Posterior tibiæ armed with two spines, one near the base small, the second a little past middle long robust.

Long. ex. tegm. 8 mill.; exp. tegm. 18 mill.

Costa Rica. (Van Patten.) Coll. Godman and Salvin.

This species above has somewhat the appearance of *Locris transversa*. Thunb., from S. and E. Africa.

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Sphenorhina septemnotata, n. sp.

Fulvous, shining, tegmina with seven small orange spots, three in a transverse line near base, two near middle, and two near apex. There is also a small orange patch at base. Wings pale hyaline; hind tibiæ armed with two spines, first small near base, the second long, robust a little past middle.

Long. ex. tegm. 6 mill.; exp. tegm. 20 mill.

R. Susio, Costa Rica (Rogers). Coll. Godman and Salvin; Distant.

Sphenorhina grandis, n. sp.

Sanguineous. Tegmina with a very broad black border, which, commencing about one-third from base, is carried along costa, continued round apex and along inner edge to about one-third of its length, when it is gradually narrowed and carried upwards along claval suture to near base. This border is widest at apex and inner border. Wings fuscous, hyaline. Fore legs black; hind femora, abdomen above (excepting near lateral borders) and below, antennæ and eyes sanguineous. The tegmina are very thickly and finely punctured, the pronotum somewhat pubescent and obscurely and finely punctured. Posterior tibiæ armed with one strong spine.

Long. ex. tegm. 15 mill.; exp. tegm. 50 mill.

New Granada.

Sphenorhina Bogotana, n. sp.

Head, pronotum and scutellum, sanguineous; tegmina luteous, apical third pitchy, which is continued as a subcostal streak towards base. A sanguineous submedian longitudinal fascia commencing at base and continued to near apex, when it is abruptly deflexed and terminates on inner margin. Wings fuscous, hyaline, shining, narrowly sanguineous at base. Abdomen above and below, legs and coxæ, black; hind femora somewhat paler. Face, eyes and antennæ, sanguineous. Posterior tibiæ armed with one spine.

Long. ex. tegm. 11 mill.; exp. tegm. 33 mill.

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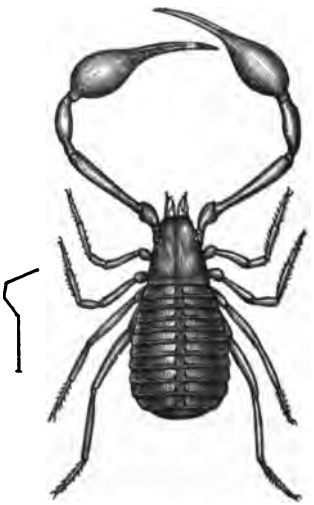
XV. *Description of a new species of* Chernetidæ (Pseudoscorpionidæ) *from Spain.* By Chas. O. Waterhouse.

[Read Feb. 6th, 1878.]

At the May Meeting of the Entomological Society Mr. Grut exhibited a large species of *Chelifer* which he had received from Mr. Sydney Klein, who had taken the specimen in North Spain, in the crevices of rocks by the sea shore.

As the species appears to be undoubtedly new, I have thought well to describe it.



I sent a drawing of the specimen to Dr. Ludwig Koch, who has recently published a monograph of the *Chernetidæ*, and he pronounces it to be distinct from his *Garypus litoralis*, the only species to which I thought it could possibly be referred.

Dr. Koch throws some doubt on the species belonging to the genus *Garypus*, because it has not the cephalo-

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thorax so much produced anteriorly as in the species produced by him. I think, however, that it would be unadvisable to propose a new genus for it on such slight grounds, and I, therefore, place it for the present in that genus.

I propose to name it—

GARYPUS SAXICOLA.

Total length 7 millm., total length of palpus 11 millm.

The whole of the upper side is ashy-grey, the divisions between the abdominal segments and the whole underside are much paler, approaching to white; the palpi are rather darker than the upper surface of the body, and are tinged with greyish-purple, the apical joint rather more brown; the legs are pale testaceous.

The cephalothorax is broadest behind, narrowed in front, with a scarcely-perceptible mesial longitudinal impression in front. Two eyes on each side, placed on a slight swelling.

Mandibles shining, pitchy-testaceous, beset with a few long bristles. Palpi with the coxal joint short pear-shaped, testaceous, thickly but very finely granular, beset with a few very short fine bristles; the femoral and tibial joints a little enlarged towards their apex, thickly and very finely granular, the former very nearly $\frac{1}{3}$ longer than the tibial joint; the last joint very nearly twice as long as the femoral joint, extremely finely granular, the finger about $\frac{1}{4}$ longer than the swollen part, rather strongly granular and beset with some fine bristles. The abdominal segments are divided in the middle, closely, finely, but distinctly granular in the same manner as the cephalothorax.

Hab.—Spain. Brit. Mus.

I have been using a compound microscope, with a low power ($1\frac{1}{2}$ inch), to give the sculpture. With this glass the granulation of the cephalothorax and abdomen and fingers of the palpi are easily seen, but the sculpture of the femoral and tibial joints of the palpi is only seen by looking very carefully.

The specimen from which I have taken my description lived until September last; it caught house-flies which I placed in the box with it, and I noticed that the flies died very quickly when only held even by one pair of claws fixed in the thorax.

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XVI. *Notes on South African insects.* By J. P. Mansel Weale, B.A.

[Read April 3rd, 1878.]

On some insects found on Acacia horrida, *and protected by resemblances to various parts of that tree. Foliage imitators.*—The foliage of *Acacia horrida* is bipinnate; at the base of each leaf on the foot-stalk is a somewhat ovate gland, which yields a gummy secretion. The young leaves which appear after rain, irrespective of the season of the year, have their pinnæ closely appressed; they are brilliant golden-green in colour, with a tinge of orange-crimson, and shine very brightly from the exudation of a kind of gummy varnish, which becomes hard towards noon in hot weather, and, I believe, protects them from the excessive evaporation they would otherwise suffer. The thorny stipules in this stage are coloured nearly the same as the foliage, but with age, in dry districts, become white, assuming different shades of colour, and also different sizes. The leaves, when full grown, have a brilliant gloss. Towards night they droop and close their leaves, as also in wet weather during the day. From the broken nature of the foliage, and the open situations in which these trees are generally found, it is evident that under a clear sky and a brilliant sun the effects of chequered direct light with that reflected from the foliage must dazzle the eye. These extremely white lights on the foliage of most South African shrubs are painfully conspicuous to the painter.

The brilliant silvery ornaments which render so many of our South African insects objects of peculiar beauty, and which would apparently make them extremely conspicuous, under these circumstances admirably disguise them.

As instances of foliage imitators among Rhopalocerous and Heterocerous larvæ, *Acridiidæ*, *Locustidæ*, *Mantidæ*, *Hemiptera* and *Arachnida*, may be mentioned the following species:—*Cœnobasis amœna*, Feld., a small moth allied to *Limacodes*, *Gynanisa Isis*, mentioned in

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Darwin's "Descent of Man" (Vol. II., p. 132), *Phaneroptera zebrata* (*Locustidæ*), a species of *Locustidæ* belonging to the genus *Saga* (?), the larvæ of *Lycæna otacilia* (Trim.), and *L. amarah*, the larvæ of *Harpax spinocula*, and other *Mantidæ*, *Epeira vigilans*, Blackm., &c.

The eggs of *Gynanisa Isis*, and of several other large Saturnian moths, are usually hard, bright, and easily seen, and are attached to conspicuous parts of the outer branches of the tree. I am inclined to think that they are not subject to many enemies. In the first stage the young larvæ are sienna-brown in colour, and harmonize in tint with the young twigs on which they may be found for some time clustered. Their colour is nearly the same as that of the larva of a species of *Cucullia*, which closely resembles the bark. Later the larva becomes green-coloured with white markings, and small protuberances tufted with darkish setæ. When it has acquired a considerable size it assumes those splendid silver and gold-tipped spines which make it such a conspicuous object on removal from the tree. The larva of *Saturnia Apollonia*, though smaller in size, closely resembles that of *G. Isis*, but the dark markings, being replaced by crimson, add to its beauty. In its earlier stages the small setæ on the dorsal protuberances produced a painful irritation on the skin, a peculiarity apparently not possessed by *G. Isis*. The caterpillars of this last species I believe to be eaten by several birds, and I know that they were formerly much relished by the Fingo tribe, to whom they are known as "Y-goinya," or, as they are called by the colonists, "Kaffir oysters." I may mention that my son declared that they were very good when roasted over the fire.

The females and larvæ of some Orthopterous insects, as also the males in a less degree, are adorned in a similar manner with white enamel-like markings. In a species of *Pneumora* I have generally found the young on *Schotia speciosa*, the foliage of which affords even a better refuge to these green, red and silvery insects, than does that of the *Acacia*. Several species of an Orthopterous insect belonging to the genus *Saga* (?) have the abdominal segments laterally marked with silvery white in loops, the insects sometimes being rufous, or of different shades of green. It is said to feed on other *Orthoptera*, especially *Truxalids*, to which it bears a general resemblance, but

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although of a fierce disposition this statement requires confirmation.

A silvery coloration of the underside effectually protects at least three native butterflies when at rest, viz., *Nymphalis Jahlusa*, *Iolaus Silas* and *I. Sidus*. These butterflies are extremely rapid on the wing and fly generally in the brightest sunshine, but their flight is usually short.

The best representations of protective resemblance to the young foliage are offered by the larvæ of *Cœnobasis amœna*, Feld. (a small moth allied to *Limacodes*), and of *Lycœna amarah* and *L. otacilia*. The first of these is a most lovely object; the tufted tubercles with which it is adorned, and the loop-like markings on the sides, disguise it effectually. From observing one on the still dewy tree in the early morning, I am inclined to think that the enamelled spots of blue and white, which shine on its back, are advantageous in disguising it while feeding. The imago of this and of another species are colour protected, while the pupa case fastened to the branch resembles an excrescence of the bark.

The larva and mature form of a *Harpax* allied to *H. spinocula*, two spiders and two small caterpillars also have a general resemblance to the young foliage.

The Orthopterous insect *Phaneroptera zebrata* deserves instead the specific name of "*pinnatifoliata*," for in every stage it is most difficult of detection, and though very abundant I have heard it singing towards dusk on a branch close to my face and yet found it extremely difficult to see the insect.

An undetermined Hemipterous insect has a general resemblance in colour to the foliage, and when viewed obliquely, its colour and markings cause it to strikingly resemble the scarred petioles and petiolules of the leaves. Various small geometric caterpillars which feed on the foliage are in like manner disguised. The larva of a moth, probably a species of *Psyche*, strips the leaflets to form cases: in addition to the leafy protection the case is so tough that I imagine few could open it. A small caterpillar, referred to in the "Descent of Man" (Vol. I., p. 416), packs the flowers and leaflets on its back by means of short setæ which secrete a glutinous substance. This caterpillar, when placed in a box with leaves and flowers, showed a preference for coloured objects by detaching and fixing on its back pieces of pink paper from the lining of

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the box. I believe there are more than one species which do this, as I found one on a *Rhus* with the flowers of that shrub similarly packed.

Imitators of thorns, excrescences, dead foliage, stems, bark, &c.—The larvæ of two moths, one of which is allied to *Pyralis*, form cases which exactly resemble the thorns of the *Acacia* and of *Celastrus buxifolius*. Sometimes a leaflet is attached to the extremity of the thorn. Those larvæ found on the *Acacia* are very much attacked by Ichneumon-flies, in spite of the deceitful appearance of their case. Indeed, I have found that most protected larvæ are thus persecuted by parasites. The moth of this species is commonly found in the day-time nestled among some of the accumulations of dead leaves abundant on this tree, and which are often made use of by various insects for nests. The *Acacia* is liable to so many diseases and distortions from fungoid growths or boring insects that considerable collections of *débris* are found on its branches, and these are taken advantage of by various insects more or less darkly-coloured, particularly *Hemiptera* and spiders. Among the most curious of these is *Pephricus paradoxus*, which closely resembles some of these bundles of dried pinnæ. *Pyrops marginata*, West., when mature is commonly found on the branches, but its true food plant is *Rhynchosia pinnata*.

A species of *Mantis* (*Popa spurca*, Stål), found on various shrubs, is of different shades of brown, and in its different stages of growth, especially when immature, resembles dead stalks.

A *Phasmid* (*Palophus Haworthii*, G. R. Gray), found near Cradock, like many of these insects, resembles a dead stick. Several spiders, such as *Epeïra vigilans*, and a species of *Cærostus*, resemble the dead fragments of bark and broken stems. *Pycnacantha hystrix*, Thor., a spider found on grass near a thorn tree, bears a wonderful resemblance to a dead thistle head, which deception is aided by the motionless position of the *Arachnid* when captured, and is such as to deceive the most careful observer.

Among the insects commonly found are several which wonderfully resemble the droppings of birds, and their coloration, as might have been anticipated, is extremely variable. The pupæ of *Pieris agathina* and *P. poppea*, the larvæ of which feed on species of *Loranthus*, have this resemblance, while a small *Mantis* (*Oxypilus annu-*

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latus, Serville = *Capensis*, Saussure), an undescribed species of *Thomisus*, an *Epeïrid*, a species of *Zilla*, and a small moth (*Acontia formosa*), extremely variable in its colour, are always found in conspicuous positions, and by the attitudes they assume are difficult to distinguish from the real droppings. The little *Mantis* in particular, though extremely active on being disturbed when frightened or on the watch for prey, doubles all its limbs together and bends back its abdomen in such a manner as to appear quite inanimate.

Floral imitators.—None of these are peculiar to the *Acacia*, unless it be a species of Longicorn beetle, and I am inclined to think that this is not protected by its yellow-coloured bands. *Harpax spinocula*, and another species of *Thomisus*, extremely variable in colour, are found on the flowers of this and many other yellow blossoms of different orders, such as *Compositæ*, *Liliaceæ*, &c. The flower-packing larva I have already mentioned. I may also state that the blossoms are often frequented by small Lamellicorn beetles having very long hind legs which project from the blossoms. Similar insects are also found on many *Compositæ*, and in the same situation may be found spiders which thrust up their forelegs in such a manner as to be hardly distinguishable from the beetles. From the frequency with which I have found these insects associated together I can hardly doubt that the attitude assumed by the spider is imitative.

Mimicry of ants by spiders of the genus Salticus.—It is well known that among spiders of the genus *Salticus* there is a group (*Attus*, Walck.), of which the resemblance to ants is wonderfully close. As I am not aware that any explanation of this curious similarity has been given, I now make known my observations on some of the species. An ant of the genus *Crematogaster*, and another belonging to *Camponotus*, are each of them imitated by spiders, and in both cases, but especially in the first, I have noticed the spiders mingling with the ants on apparently friendly, or at least neutral, terms. The small black *Crematogaster* is imitated by a spider of the same size and appearance, being smooth and shiny. It was very curious to notice the spider curving its long forelegs after the manner of the ant's antennæ, turning up its abdomen exactly like the stinging *Crematogaster*, and occasionally halting, and then again speeding along the branches. In fact, so close

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in appearance and habits are the two creatures, that I have frequently lost sight of the spider, or captured an ant in mistake.

The *Salticus* which imitates the *Camponotus* is larger and hairy, like the ant. Both these ants are fond of sweet secretions, and visit the glands of the *Acacia*, and also various kinds of Homopterous insects, the *Crematogaster* being particularly attentive to different species of *Akeres*, and it was on a diseased orange tree that I first noticed the friendly terms on which the spider lived with the ants. A great many small flies and other insects frequent trees thus diseased, and in such numbers that I have little doubt they may seriously diminish the food of the ants.

The *Orthoptera* referred to in this paper have been identified by Mr. J. Wood-Mason. An explanation of the mimicry of ants by spiders has been suggested by Mr. Meldola. (See Proc. Ent. Soc., April 3rd, 1878, p. xiv.)

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XVII. *On* Macropsebium Cotterilli *and other new species of Coleoptera, from Lake Nyassa.*

By H. W. Bates, F.L.S., Pres. Ent. Soc.

(Read June 5th, 1878.)

Mr. H. B. Cotterill, who has recently returned from a prolonged visit to Lake Nyassa, and who was the companion of Captain Elton on his adventurous journey of exploration overland from Lake Nyassa to Zanzibar, collected a few insects during his leisure hours in these little known regions. One of them, which he has kindly added to my collection, is a remarkable new form of Longicorn beetle, allied to *Necydalis*, but of gigantic size for this group, and showing Prionid affinities in the separation of the epistome. I venture to submit a description of this interesting insect, adding those of four other species from the same region, taken by other travellers.

Anthia vitticollis.

A. omostigmæ (Chaud.) affinis. Minus convexa, nigra vix nitida, thorace vitta antico-laterali elytrorumque margine flavo-tomentosis; elytris punctulato-striatis, interstitiis vix convexis sparsim setifero-punctulatis.

♂. Thorace postice bilobato-producto, antice paulo rotundato-dilatato ibique quam lobis vix latiori.

♀. Thorace breviter cordato, angulis anticis distincte productis.

Long. 20—24 lin.

A fine and distinct species, belonging to the group with spotted thorax, and differing from *A. thoracica* in the spot not being broad and rounded but narrow and vittiform, as in *A. omostigma*. The shape of the thorax is also very different, the anterior dilated part in the ♂ being but slightly rounded and not much broader than the posterior lobes. These latter, in fully developed examples, are oblique at the apex, the external angle acute, and the central dividing line deeply cleft. The ♀ is distinguished also by the sides of the thorax being

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gently rounded and gradually narrowed posteriorly, with the anterior angles much advanced beyond the anterior margin.

Lake Nyassa; apparently abundant. Sent home in large numbers by Mr. Thelwall.

Anthia alternata.

A. Fornasinii (Bert.) affinis, at differt elytrorum interstitiis alternatim griseo-pubescentibus. Niger, capite thoraceque grosse sparsim punctatis, hoc (ut in *A. Fornasinii*) antice fortiter subangulatim dilatato, postice sinuatim fortiter angustato et declivi; elytris versus basin angustatis, humeris nullis, versus medium valde rotundato-dilatatis; interstitiis alternatim griseo-pubescentibus.

Long. 21 lin. ♂, ♀.

Von Harold has recently described an allied species, *A. Hildebrandti*, from Zanzibar, as having the alternate interstices of the elytra higher and broader; but in this all the interstices are smooth, with the exception of the usual lateral punctures near the striæ. In *A. alternata* the interstices 1 (sutural), 3, 5, 7, are elevated, widened and glabrous, whilst the alternate ones and the lateral margin are depressed, narrow and densely covered with yellow-grey hairs arising from punctures.

Lake Nyassa (or R. Shiré?). Brought by Mr. E. D. Young from his Expedition of 1867. It appears not to have been met with by recent collectors on Lake Nyassa.

Plocæderus hamifer.

Oblongus, latus, robustus, nigro-fuscus, palpis, pedibus et antennis piceo-rufis; his (♂) corpore plusquam duplo longioribus, articulo 11mo longissimo, 3^{io} extus valde 4—6 brevius spinosis, 1mo grosse transversim rugato; thorace transverso, transversim irregulariter plicato, spina laterali valida, hamata, tuberculo anteriori conico; elytris subtiliter coriaceis utrinque leviter bicostatis, apice bispinosis; corpore subtus fulvo-pubescenti; femoribus grosse transversim rugatis.

Long. 1 in. 8 lin.

A large robust species, brownish-black in colour, opaque except on the elytra, which are faintly shining. The thoracic spines are long, acute and recurved backwards, and the femora are crossed from base to apex with flexuous ridges. The antennæ are more than twice the length of

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the body, dark chestnut-red and glabrous; the short, curved, clavate basal joint is transversely ridged like the femora, the 2nd to 6th are sparingly punctured; the 11th joint is slender and nearly one-fourth the length of the entire antenna.

Lake Nyassa. From Mr. E. D. Young.

Callichroma Nyassæ.

Gracile, cyaneum vel viridi-æneum, supra nitidum, subtus argenteo-sericeum, femoribus et tibiis 4 anticis (his basi exceptis) femoribusque posticis dimidio basali, rufis; antennis ♂ corpore longioribus, articulo basali apice extus spinoso, tertio sequenti paulo longiori, 3—10 lateraliter sulcatis, apiceque subtus incrassatis; thorace medio lævi, lateribus subtiliter sparsim striatis; elytris elongato-subparallelis subtiliter punctulatis et minute strigulosis, sed nitidis, glabris; femoribus posticis abdomine paulo longioribus, gradatim clavatis.

♀ Antennæ corpore vix breviores.

Variat: tibiis omnibus femoribusque posticis chalybeo-nigris; elytris lateribus violaceis.

Long. 9—10 lin.

A moderately narrow and elongate species, differing from the typical *Callichromæ* in the slightly clavate hind femora. The other characters are those of the genus, and the hind tibiæ are compressed and flexuous along their upper edge as in the typical species. The head is nearly smooth, having only a few faint longitudinal striæ. The thorax is rather longer than is the rule in the genus; the lateral spine less acute, and the other lateral prominences wanting. The anterior and posterior transverse constrictions also are very slight and marked only by a few fine furrows. The scutellum is scutiform and nearly smooth.

Lake Nyassa. From Mr. Thelwall's collection.

MACROPSEBIUM, nov. gen. (Sub-fam. *Necydalinæ.*)

Gen. *Psebio* (Pascoe) proxime affine. *E maximis* hujus subfamiliæ. Corpus elongato-oblongum, supra planatum. Caput exsertum; epistoma brevissimum, a fronte suturâ profundâ separatum, fere articulatum; oculi supra (♂) separati, minus subtiliter granulosi; palpi graciles, articulis terminalibus lineari-compressis. Antennæ (♂) corpore dimidio longioribus, articulis 3—11 subæqualibus, in laminas lineares compressis; 1mo brevi, crasso, difformi.

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Thorax inæqualis, lateribus grosse unituberculatis. Elytra abbreviata (metathorace vix longiora) apice angustata, singulo fere triangulum formanti, apice unispinoso. Pedes compressi; tibiæ anticæ curvatæ; posticæ flexuosæ.

A remarkable African form of *Necydalis*, agreeing with the typical genus in the non-dilated terminal joints of the palpi, broad and posteriorly tapering mesothoracic episterna, salient anterior coxæ, with atrophied prosternum, and sockets elongated laterally and opened behind. In the excessively short muzzle and very long antennæ it agrees with the genus *Psebium*.

Macropsebium Cotterilli.

Castaneo-rufum, subopacum, elytris castaneo-nigris politis; capite, thorace, antennarumque articulis 2 basalibus obscurioribus; corpore subtus, capite, thorace et scutello, rufo-hirtis; pedibus breviter rufo-pilosis, antennis nudis; elytris supra planis, minutissime punctulatis, bicarinatis.

Long. (ad abdominis apicem) 15 lin. (ad alarum apicem) 18 lin. ♂.

The separation of the epistome from the head in this remarkable species is more complete than in the majority of the *Prionidæ*. The labrum is depressed between the base of the mandibles, and bears two long tufts of rufous hairs. The general colour of the insect is chestnut-red, with the head and thorax rather darker, opaque and minutely reticulate-punctate; the elytra are dark blackish-brown and highly polished, although finely punctured. Each elytron forms a curvilinear triangle, the apex of which at the inner side is prolonged into a stout spine. The ample metasternum is clothed with long, furry, rufous hairs, and similar hairs, but shorter, clothe all other parts of the body except the elytra and the antennæ; the latter being minutely granulate and opaque from the third joint. The excessively flattened antennal joints are slightly dentate at their apices on one side. The abdomen is broad and sessile.

Lake Nyassa. Discovered by H. B. Cotterill, Esq.

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XVIII. *On the larvæ of the* Tenthredinidæ, *with special reference to protective resemblance.* By P. Cameron.

[Read June 5th, 1878.]

The purpose of the following paper is to show that the theory promulgated by Wallace,* in explanation of the colours and markings of caterpillars, namely, that edible larvæ are coloured so as to be invisible as much as possible, and inedible ones so as to be easily seen, holds good with the larvæ of saw-flies. I purpose also showing that caterpillars and saw-fly larvæ have the same style of coloration and arrangement of the markings both in the edible and inedible larvæ, that is to say, that the former are green, either entirely so, or if they bear any markings these take the form of white or pink continuous lines along the back or sides, while the latter have contrasting colours; the markings are usually irregularly-arranged dots, and they feed in exposed positions where they are readily noticed.

I need scarcely point out how widely different the *Tenthredinidæ* and the *Lepidoptera* are, how they belong to two different orders, differing profoundly in almost every detail of structure, and having no very close generic affinity with each other.

Let us first consider those saw-fly larvæ, whose bodies correspond in coloration with the substances upon which they are usually found. Many of these have flat bodies, and rest when feeding upon the lower side of the leaf. In every case they are uniformly green, with the head faintly brownish, or it may be green, like the rest of the body. A beautiful example of the flat green larvæ we find in that of *Camponiscus luridiventris*, which seems indeed to have been specially formed for this mode of life, being very broad and flat. We have other instances in the *luteus* group of the genus *Nematus*, which feed on the lower surface of the alder leaves, and in *Nematus pallescens*,

* See Darwin's "Descent of Man," 2nd ed. p. 325.

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whose body corresponds in coloration with the leaf of *Salix cinerea*, its food plant. These larvæ are very sluggish.

Another group of harmless larvæ feed along the margin of the leaf. They have cylindrical bodies, the colour green, or if they bear any markings, these take the form of whitish or pinkish dorsal or lateral stripes. We have said that they feed along the outer edge of the leaf. Necessarily, in feeding, they cause indentations in the leaf. The indentations are very regular, are cut clean as if by a pair of scissors, in shape they are oval or semi-circular. When feeding, the larvæ keep their bodies closely pressed to the leaf, and if there be a curve, either a natural one or made by themselves, they follow its shape. We may point out as examples of this habit, *Nematus miliaris*, *N. fagi*, *N. fallax*, and others.

It is a matter of familiar observation to collectors of *Lepidoptera*, that most caterpillars, which feed on grass or narrow-leaved plants, are green, either entirely so, or with white or reddish continuous stripes, and so it is with the saw-fly larvæ. In *Nematus* it is the case with *N. capreæ*, *N. conductus*, which feed on carices and grasses respectively, with *N. fallax*, which is attached to the little trailing willow *Salix fusca*, with *N. rumicis* on *Rumex*, *N. mysoitidis* on clover, *Taxonus glabratus* on *Polygonum*, and many others. In the Ent. M. Mag. XI. p. 66, the Rev. John Hellins relates how similar in coloration the larva of the moth *Erastria fuscula* and that of a saw-fly, which feeds on the same grass, are to each other, and he proceeds to say that "he will leave it to some one else to guess which of the two is the first wearer, and which the mimic of the colours of their common dress." But it is clear that here we have no case of mimicry, but rather that both acquired the same garb through its being that which afforded them the greatest protection, similar habits and similar surroundings having led to identity in coloration.

It is equally well known to Lepidopterists that pine-feeding caterpillars assimilate very closely in coloration with the pine leaves. This is so well known that I need scarcely quote instances; it occurs with widely different families of moths. The same thing occurs with the saw-fly larvæ. I may mention as examples *Nematus Erichsoni*, *Lophyrus virens*, and many others.* One of the finest cases

* They feed resting perpendicularly, which is seldom the case with larvæ attached to broad-leaved plants.

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of protective resemblance I have seen was with a species of *Nematus* on the juniper. It could scarcely be seen, so much did its body resemble the leaves. I need scarcely say that many caterpillars of moths on the juniper have the same colour.

We have seen that the innocuous larvæ are either flat or cylindrical, the former feeding on the flat surface and the latter along the edge. It is equally so with those which smell badly.* Curiously enough, the flat larvæ in both the groups are uniformly green, and have the same sluggish habits, but there is a marked difference in their ways of feeding. I have said that the edible ones feed on the under side of the leaf. They eat the leaf quite through, so that in a short time it becomes full of square or roundish holes, the creature resting always on the uneaten portions. Now the others rest on the upper side. They do not eat the leaf through and through, but only the upper cuticle, so that when the larvæ have been feeding for any period, the leaf becomes quite white, and the larvæ are then not difficult to see. Now we find that larvæ which have this habit are either covered with a slimy secretion, as some species of *Eriocampa*, or they emit bad odours, as is the case with some *Nematides*. The larva of *Nematus leucotrochus*,† for instance, which feeds on the hawthorn, has an exceedingly bad smell. I tried this larva with a *Carabus* to see if the beetle would eat it, but it would not do so, although afterwards it ate a bit of a worm.

The inedible larvæ which feed along the edge of the leaf are very different in coloration and habits from the green margin feeders described above. Many of them have a greenish tinge, but it is seldom or never of the same tint as the leaf. Frequently it is bluish or sea-green, or it may be whitish. Instead of the white or pinkish stripes they bear irregular dots and marks, which

* Although I have not made many experiments with the foul-smelling larvæ to see if they are rejected by insectiverous animals, still I think it is allowable to conclude from the bad secretions they give out that this is actually the case.

† These larvæ are very difficult to rear. I have only bred three females, which unfortunately died in the cocoons before they got entirely rid of the pupal skin. They are thus not easily identified, but the specimens appear to agree in every respect with *N. leucotrochus*. Brischke and Zaddach figure (Schr. Ges. König. XVI. pl. 6, f. 5) a species of similar habits and coloration under the name of *N. xanthopus*, but as the description has not yet appeared, I can't say whether it is the same as mine or not.

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do not form regular lines. The markings are usually black and orange, and often fore and aft the body is orange or yellow. Instead of keeping their bodies close to the leaf and following its outline they stick them out into the air, so that they assume the form of a U, the turned-up tail reaching to the head and frequently above it. Some of them bear black marks on the belly, between the ventral legs, and also glands, which they can protrude at will, and from which exude a fœtid odour. To make them even more conspicuous, several of them feed on the same leaf, while they keep the posterior part of the body in a state of continual agitation. Most of them are uneaten by birds, and they are also proof against the attacks of insects, for a cockroach would not eat some larvæ of *Nematus pavidus* with which I supplied it, after having subjected it to a fast of some days, while it devoured those of *N. miliaris*.

I think that the habit these insects have of whipping the body about is not so much to frighten birds as to intimidate ichneumons from depositing eggs in their bodies. I once observed a *Tryphon* endeavouring to lay its eggs in some larvæ of *Crœsus septentrionalis*, which at that time were very common on an alder bush. It tried it on several larvæ. In one case five larvæ were on the same leaf, and whenever the parasite approached them in a moment they were in a state of considerable agitation, and the intruder was driven away by the active lashing of their bodies. It, however, succeeded with a solitary larva which was rather inactive, being apparently about to moult. I may here remark, that every saw-fly larva which I have found "stung," *i.e.* with ichneumon eggs on its body, had them invariably on the fore region of the body, generally on the thorax, frequently even on the head—a circumstance readily understood when we consider that the posterior part of the body can be easily moved away, while the anterior part can only be removed by the creature letting go its hold of the leaf. The only way it can do this with sufficient swiftness to escape the ovipositor of the ichneumon is by dropping to the ground at once. And this we find to be the case with many larvæ, especially with those attached to grasses and other low-growing plants, *e.g.*, the larvæ of *Dolerus*, *Tenthredo*, which drop down on the slightest occasion. On the other hand, larvæ attached to trees do not readily drop down, but then we have seen that some of them can protect themselves by

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means of the flexible abdomen, and others, as we shall see, have especial means of protection.

Take, for example, the larvæ of *Trichiosoma;* these are among the largest in the family. They are white, which contrasts well with the green of the leaf, and, as they feed openly, they are readily observed. They have the faculty of ejecting from lateral pores an acid greenish liquid to some distance and in some quantity. I have no doubt that this is as much a protection against ichneumons as against birds. We know, indeed, from the observations of Lewis (quoted by Westwood, Intr. ii. 108), that the larva of *Perga* (an Australian genus closely allied to the *Cimbicides*) carries in its mouth a yellowish gummy matter, which it can vomit in some quantity when there is any occasion for it. That it is of some protection against ichneumons is shown by Lewis finding an ichneumon which preys on the larvæ with its legs and wings covered and glued together by this gummy matter.

Most of the larvæ of the *Cimbicina* feed on trees during the day, and they hold on very firmly to the leaf. They are in coloration white or greenish-white, without any distinct marks, and in some cases are covered with a whitish exudation. An exception to this rule is found in *Abia sericea,* which is found on *Scabiosa succisa,* usually in the evening. It is of a drab colour, with orange lateral marks. When alarmed it drops at once to the ground * in the form of a ball. I always, when searching for this larvæ, was much puzzled to find it when it had dropped down to the ground. Frequently when found I have lost it again by removing my eye for a moment, and yet it could not have changed its position. Indeed, most larvæ which fall readily to the ground in the form of a ball are difficult to find.†

It is curious to see how different the larvæ are in the same genus—even a small one—and how interesting it is to find that these differences are explained by their habits, and especially as regards their means of protection. Take, for instance, the genus *Crœsus.* Two of our species have very distinctly-marked larvæ. *C. varus,* on the contrary, although it has the form and habits of

* It feeds also on the under side of the leaf, while the tree-feeders rest on the upper side.

† This habit of falling down to the ground and remaining there motionless, rolled up into a ball, is analogous to the "shamming dead" of perfect insects.

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C. septentrionalis (*vide supra*), is much less active, has no coloured marks on the belly; it has the ventral glands, but they are rarely protruded, nor has it (so far as I can judge) a very bad odour; indeed, I could not feel any from some specimens which I examined last year. Above all, the larva of *varus* is of the same green as the alder leaf upon which it feeds, and has no markings beyond some slight black lines along the sides. It is thus less noticeable than the other larvæ, is more solitary in its habits, and hence we can understand how it is not so active, nor has such a bad smell as the others.

I have stated before that many pine-feeding larvæ are coloured to resemble the pine leaves—either entirely green, or green with a white lateral stripe. But this is not the case with all of them. *Lophyrus pini* has a pale-coloured larva with round black marks on the sides. It feeds, too, in companies, frequently two or three dozen, if not more, being found on the same shoot; so that in this way they form, when massed together, very conspicuous objects, the more especially as they strip the branches almost completely of their leaves. The distinction of the *pini* and *virens* larvæ is readily explainable by the fact that the former exudes abundantly a resinous secretion, which sticks firmly to the hand, while the latter does not give out any.

Many of the brightly-coloured saw-fly larvæ have hairs on the body, each issuing from a raised tubercle. These hairs, however, are not very thickly distributed over the body, generally about a dozen or so to a segment, so that they do not in any way obscure or hide the coloration. The larva of *Nematus ribesii* is a case in point, and it is not eaten by birds. A more conspicuous example is found in the larva of *Cladius viminalis*, which is orange with black markings, and they feed in a row, three or four lying abreast and almost touching each other. All the larvæ, however, of this class are not brightly coloured. Thus, most of the larvæ of *Cladius* are pale coloured, or dark coloured on the back and white at the sides.

While there are no hairy larvæ among British saw-flies comparable,—for instance, to caterpillars like the tiger moth,—there are some Tenthredous larvæ provided with longish stiff-branched spines, which give their bearers a very curious appearance. These spines are black (as a rule) on the back, with green ones along the

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sides, and they project straight from the body. The ground colour of these larvæ is green, and the spines are never so thick as to hide the coloration of the body. With some species there are some little white lines between the rows of spines. The larvæ feed on the upper side of the leaf; they are very sluggish and rarely measure more than four lines. I believe these spines standing up from the green body tend to conceal the larvæ, which do not look like living creatures at all; and this inanimate appearance is increased by the small retreating head. One or two species have the spines pale green.

There are many other points of similarity between the larvæ of the *Tenthredinidæ* and *Lepidoptera* which, if time permitted, I should have liked to discuss, as well as some others belonging more particularly to the Hymenopterous section. I may, however, say, that all the conclusions arrived at by Weismann, in his work* on the origin of the forms and colours of caterpillars of the *Sphingidæ* apply with equal force to the *Tenthredinidæ*. That being the case, the cause or causes which produced the general similarity in the markings of the larvæ of saw-flies and of caterpillars must have been the same, and that natural selection was one of the most proficient of them will now, I think, be admitted by the majority of naturalists.

I may add, further, that when young the larvæ of saw-flies are green and devoid of distinctive markings, just as we find among moths.

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* Studien zur Descendenz-Theorie, ii.

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XIX. *On some Longicorn* Coleoptera *from the Hawaiian Islands.* By D. Sharp.

[Read June 5th, 1878.]

I shall record in this paper the species of Longicorn *Coleoptera* (*Cerambycidæ*, Munich Cat.), found by the Rev. T. Blackburn in the Hawaiian Islands, and describe the new forms. The species altogether are nine in number, and although when all the islands of the group have been carefully searched there will almost certainly be some additional species discovered, yet as the *Cerambycidæ* form one of the best known of the families of *Coleoptera*, it will be worth while to see what light these insects throw on the nature of the fauna of this isolated group of islands.

My very imperfect knowledge of this enormous family of beetles would not justify any considerable reliance being placed on my views on this point, but as I have received from my friend H. W. Bates, the most worthy present President of the Society, considerable assistance in the study of these specimens, I feel sufficient confidence to venture on some provisional observations.

The species are, as I have said, altogether nine in number, and I will remark on them seriatim.

1. *Parandra puncticeps* appears to be a very distinct species of a highly remarkable genus; the *Purandræ* are, in fact, the least differentiated of the Longicorns; that is to say, the characteristics of the Longicorns are on the whole less developed in these insects than they are in any others that are generally admitted as forming part of the family.

2. *Stenocorus simplex*, Gyll. This species is very widely distributed in the Malayan and Polynesian Islands, and has even been found in Ecuador; it is therefore pretty certainly a species which is easily conveyed by natural (or possibly artificial) means over large tracts of ocean.

3. *Astrimus obscurus*, n. sp., n. gen. This insect belongs to the same group of genera as the *Stenocorus simplex* on which I have just remarked, and is excessively closely allied to a species found in the island of Formosa.

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4. *Sotenus setiger* belongs also to the same group as the two preceding species (*Callidiopsides*, Lacord.). I cannot find that it has any very close ally, and I expect it will prove a quite endemic species of the group which is largely represented in the Australian and Austro-Malayan regions, and has also some members peculiar to North America.

5 and 6. *Clytarlus robustus* and *C. cristatus*. These are two very remarkable species, and I expect they will prove to be very isolated, yet I think they may be naturally placed in the extensive and world-wide distributed group *Clytides*, Lacord.

7. *Micracantha nutans* seems to be a distinct species of a genus, with numerous species in the Australian and Austro-Malayan regions.

8. *Lamia nutator*, Fab. This species is said to be found in Australia as well as other Polynesian Islands.

9. *Cerambyx araneiformis*, Lin. This is a widely-distributed species in South and Central America, and the Hawaiian individuals are so reduced in size as to form a very distinct variety.

It thus seems that the Hawaiian Islands have some very distinct forms peculiar to themselves; that notwithstanding their isolation certain species have been introduced into them from points of land which are excessively distant —thousands of miles, in fact—and that the nearest relatives of the Hawaiian Longicorns are found in the very distant islands occupying a south-westerly position relatively to the group itself.

Parandra, Munich Cat.

Parandra puncticeps, n. sp. Nigro-picea, antennis pedibusque dilutioribus, pernitida; mento brevissimo, in utroque sexu sine pubescentia; antennis angulis internis haud vel vix acutis; capite fortius sat crebre punctato; prothorace fortiter transverso, nitidissimo, parce punctato, medio fere omnino lævi, versus basin leviter angustato, lateribus pone medium obsolete angulatis, angulis posterioribus rectis, nullo modo rotundatis; elytris latiusculis, parce subtiliter punctatis, interdum transversim subrugosis. Long. 19—26 mm.; lat. $6\frac{1}{2}$—$8\frac{1}{2}$ mm.

This *Parandra* is of peculiar form, being flatter and more parallel than is usual in its allies, and with the thorax for its whole width closely applied to the base of the elytra. The sexual distinctions are greatly diminished,

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the male mandibles showing but little or even no difference from those of the female, so that at first it seems difficult to distinguish the sexes; this may, however, be easily done by examining the apical ventral segment. This is quite short in the male, and its hind margin is very gently and evenly rounded, and its surface is covered rather sparingly with obsolete, transverse, granular punctures. In the female the length of this segment is considerably greater, and its hind margin is obscurely truncate in the middle; the punctures are less obsolete, and the abundant ciliæ of the hind margin are twice as long as in the male. Of this latter sex I have two individuals before me, one small the other large: the smaller of these individuals shows in its mandibles no greater development than does the female; while in the larger specimen their apical portion is somewhat elongate and curved, showing thus the first stage of the development which is so remarkable in many species.

Sent from Oahu as No. 88.

Ceresium, Munich Cat.

Stenocorus simplex, Gyll.

I have seen four individuals of this species, only one of which is a male. This individual is only half the size of the females, and is remarkable by the middle tibiæ having a large prolongation inwardly at the extremity. In the female there is a slight scooping out of the inner side of the tibia near its extremity. The male has also the apical ventral segment shorter than the female, and its hind margin forming a gentle continuous curve, while in the female the more projecting middle part of the hind margin is subtruncate. In the male individual there is also a large exserted supplementary apical segment. The antennæ of this specimen are scarcely so long in proportion to the body as they are in the females; and there are also some slight differences of colour and sculpture. I think it probable, however, that these are really the sexes of one species, but I hope Mr. Blackburn may decisively settle the point. It is worthy of remark that Fairmaire considered the specimens found in Tahiti to represent three species, but as he did not distinguish the sexes, I am unable, at present, to form any opinion as to whether the union of his three species into a single one, as has been done by the more recent authors, is correct. This species

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is said to have an excessively wide distribution, but I am not myself able either to confirm or to limit this opinion.

I will make still one other remark about these Hawaiian individuals, namely, that when the intermediate coxal cavities are looked at from behind they are seen to possess a distinct outward transverse prolongation, although Lacordaire states that they are closed externally.

I have not any information as to the distribution of this species in the various islands of the group, but I believe all my four specimens are from Oahu.

ASTRIMUS (new name).

Astrimus obscurus, n. sp. Fusco-niger, griseo-pubescens et setosus, opacus; prothorace subdepresso, disco inæquali, sed vix discrete bi-impresso, opaco, tomentoso, et setoso, lateribus in medio prominulis sed haud tuberculatis, basi constricto; elytris thorace paulo latioribus, fortiter punctatis, punctis versus apicem minoribus, angulo suturali acute prominulo. Long. 11½ mm., lat. 3 mm.

This species has much the appearance of the *Stromatium* group; its sculpture and colour are much obscured by the pubescence and setæ. The elytra are slightly broader than the greatest width of the thorax; this latter has an indistinct tubercule in the middle, some distance in front of the hind margin, and near this obscure elevation the surface is more depressed and densely pubescent; on the outside of this depression the surface is very obscurely elevated. The middle coxal cavity is not really closed, although it is very nearly so. The projecting point of the side of the metasternum, which helps to close the cavity, is not shining, neither is it turned out from the plane of the rest of the metasternum, and, therefore, it is but little conspicuous.

Mr. Blackburn has sent me a single individual as No. 87; it is, I believe, a male.

I think it probable that Fairmaire's Tahitian *Stromatium hirtum* will prove closely allied to this insect. I give below its structural characters.

Form rather depressed, surface pubescent. Head with the front very short, mandibles short, conspicuously hairy externally; eyes coarsely facetted, largely and deeply emarginate, their lower lobe not approaching so near to the mesial (longitudinal) line as the upper one does; antennal tubercles distinctly elevated, and with a quite distinct

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free angle above the bulb of antenna; antennæ a little longer than body (in the male?) pubescent and slightly pilose, none of the joints with sharp angles, 1st joint rather stout, but little more than half as long as the 3rd joint; joints 4 to 11 not differing much from one another. Ligula (?); terminal joints of palpi distinctly dilated. Anterior coxæ globose, very little prominent, their cavities without external prolongation, but with the suture of its closing quite distinct, their posterior portion open; middle coxal cavities with a very small external prolongation. Legs rather short and stout, femora much thickened, but without distinct slender basal portion. Surface of thorax rather flattened and uneven, without distinct prominences or marks.

I am indebted to Mr. Bates for an insect from Formosa, which is extremely closely allied to this *Astrimus obscurus*, but is a little larger and paler in colour. I should, however, have considered the two to be conspecific, were it not that an undoubted, though minute, difference exists in the external prolongation of the intermediate cotyloid cavities; the anterior prolongation of the side of the metasternum is conspicuously shining, and is deflexed from the plane of the rest of the metasternum. As I have not been able to assign the species to any named genus, I have given it a new generic name, and enumerate its characters above. It cannot, I think, be very much misplaced in Lacordaire's *Callidiopsides*, although the antennal tubers are rather strongly elevated and distinctly angulated.

SOTENUS (new name).

Sotenus setiger, n. sp. Fulvo-testaceus, fere unicolor, sat nitidus, vertice summo transversim scabroso; prothorace subgloboso, sed dorso sat planato, leviter inæquali, nitido, fere nudo, punctis paucis setigeris irregulariter sparsis; elytris punctis profundis sat magnis, subseriatis ornatis, seriebus alternis setis erectis, tenuibus elongatis munitis. Long. 11½ mm., lat. 3 mm.

This insect is rather remarkable on account of the sculpture of the back of the head and of the punctuation of the elytra; the general form, appearance and colour are somewhat like *Lioderes Kollari*, but *Sotenus setiger* is more robustly formed.

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A single individual, which I think is a male, has been sent me by Mr. Blackburn as No. 41. It was found, I believe, in the island of Oahu.

The following are the structural characters of this species:—

Form rather robust and subparallel, not broad nor depressed. Head very short, vertex scabrous and a little inflated; eyes coarsely facetted, reniform, their upper parts very widely separated, the interval in fact being as broad as the whole width of the vertex; space between insertion of antennæ moderately broad. Antennæ rather stout, not spinose, but pilose beneath, a little longer than body (in the male no doubt), 1st joint stout, hardly so long as 3rd; 3rd not sulcate, but rather flattened above; 4th joint shorter than the following ones, equal to the 10th in length, 10th and 11th subequal. Mandibles very short; ligula membranous, apical joints of palpi rather strongly securiform. Front coxæ globular and rather prominent, their cavities completely rounded externally, open behind, rather widely separate. Intermediate coxal cavities very complete externally, so that no outward prolongation of the coxa can be seen. Middle and hind thighs only moderately long, but pedunculate; tarsi rather stout, tibiæ without carinæ. Elytra quite rounded at extremity.

The position of this form is in the Section A. of the *Cérambycides vrais sylvains* of Lacordaire, and though I cannot find that it has any close affinity with any known forms, it had better be placed in his "Group XV. *Callidiopsides*."

CLYTARLUS (new name).

Clytarlus robustus, n. sp. Nigricans, pectore, pedorum basi, tarsisque rufescentibus, antennis fuscis, apice dilutiore; prothorace subcylindrico, elytrorum basi multo angustiore, posterius declivo-constricto, medio longitudinaliter subelevato, elevatione præsertim anterius et posterius conspicuo, densissime fortiter que rugoso vel scabroso-punctato, opaco, dorso parcius albido-setoso; elytris humeris prominulis, ad basin sat latis, versus apicem angustatis, ibidemque acuminatis, parte basali rufescente, ante medium plaga obliqua nigra, irregulariter punctatis, maculisque parvis setarum albidarum depressarum; tarsis intermediis et posterioribus albido-setosis. Long. 11—13 mm., lat. 3—3½ mm.

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This species has along the middle of the thorax an elevation which is only distinct in front and behind, and commences abruptly near the front margin, so that when looked at from the front the thorax appears tuberculate close to the front margin. The elytra are rather coarsely sculptured, but the sculpture is indistinct and obsolete at the extremity; their colour is not easy to describe, is yellowish, suffused with black in such a way as to form some marks, the most conspicuous of which is a black band on each in front of the middle, the two marks when united forming a conspicuous V-like mark behind the shoulders; the wing cases are also flecked with small spots of white pubescence, which, however, are wanting from the black band, and therefore render it still more conspicuous; there is also a large but indefinite black mark near the extremity of each.

I have a pair of this species before me; the male is considerably larger than the female, and has a greater development of the middle and hind legs.

Mr. Blackburn has sent me this species as No. 100, and informs me that in the middle of 1877 he captured half a dozen specimens running with extreme rapidity on some fallen trunks of trees high up on a mountain in the island of Oahu, about six miles from Honolulu; and that soon after he found a single mutilated individual, in another locality, again high up on a mountain about twenty-five miles from Honolulu.

Clytarlus cristatus, n. sp. Angustulus, gracilis, rufescens; prothorace medio longitudinaliter elevato et scabroso, elevatione anterius per-conspicuo, utrinque subsulcato, dorso, parcius albido-squamoso; elytris gracilibus, etiam ad humeros haud latis, versus scutellum singulo subelevato, variegato-setosis; femoribus intermediis et posterioribus ad apicem fuscis, apice summo conspicue albido-vestito; tarsis posterioribus albido-hirsutis. Long. 8 mm.; lat. $1\frac{3}{5}$ mm.

This species, though very distinct from *C. robustus*, much resembles it in most of its characters. The basal portion of the elytra is irregularly covered with white hairs or scales, and there are pale yellow ones along the suture, and also some of this colour about the basal portion of the sides; the white scaled basal portion of the wing cases is followed by an irregular band covered with fine dark hairs, and behind is an indefinite small trans-

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verse band of pale hairs; all the apical portion is chiefly clothed by dark hairs, except that along the suture, and also at the apical portion there are scanty, irregularly-distributed pale hairs: there are no white hairs at all on the middle tarsi.

A single male individual has been sent from Oahu as No. 100 by Mr. Blackburn.

These two species possess the three characters the combination of which in a *Cérambycid vrai sylvain* entitles the possessor to enter, according to Lacordaire, his group of *Clytides*, viz., antennæ not surpassing the extremity of the elytra, a laterally unarmed thorax, and a basal joint to the hind tarsus longer than the two following together. I give below their characters.

Ligula membranous, mandibles short, terminal joints of palpi very little dilated, but obliquely truncate at tip. Front of head vertical, nearly at right angles with the extremely short vertex; antennal tubers not very distant, rather elevated, with a deep depression and channel between them. Antennæ rather short and slender, differing but little in the two sexes, not extending to the extremity of the elytra; 1st joint moderately long and stout; 2nd, not so extremely abbreviate as is usual in the family, but distinctly shorter than the 10th joint; 3rd, equal in length to the 1st, but only half as thick; 4th, nearly equal to 3rd; 4th—7th, each a little shorter than its predecessor; 8th, 9th and 10th, subequal and distinctly shorter than the other ones; 11th, a little longer than 10th. Eyes finely facetted, rather prominent, but not large, of an excessively short kidney form, departing in fact but little from the circular form, except that there is a well-marked notch filled with pale pubescence on their upper and inner edge contiguous with the insertion of the antenna. Front coxæ globular but distinctly exserted, so as to project a good deal beyond the prosternal process, their cavities very open behind, but with only a very small prolongation externally; prosternal process not reaching quite so far back as the hind part of the coxæ, and therefore without the least widening at its apex. Mesosternum rather large, very similar indeed to that of *Cerambyx liciatus*, Linn., its posterior prolongation having but little difference of plane or level from the front part; its articulation with the middle of the metasternum imperfect; middle coxæ rather large, globose, their cavities externally with a large opening,

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which, however, does not reach far outwards. Metasternum quite short. Hind body small and slender, but dissimilar in the two sexes; in the male placed on a very different level to the metasternum, but a good deal arched; in the female larger, and at the base much less discontinuous with the metasternum—in this sex with exserted elongate membranous apical segments. Elytra of peculiar form, with truncate base and well-marked shoulders, with their sides much deflexed, narrowed towards the apex so that they are there acuminate; they are produced beyond the extremity of the hind body, and at their termination have a divergence or opening between them, beyond which the wings project as a slender continuation, simulating a short ovipositor of some orthopterous insect. Anterior legs short; middle and hind ones elongate, the latter remarkably so, the thighs slender at their extreme base, but with an elongate apical thick part, which is more developed in the male than in the female; tibiæ laterally compressed, so as to be very slender viewed from behind, and yet appearing rather stout when looked at laterally, thinner at the knee than at the apex, a little sinuate when their inner face is looked at. Hind tarsi with elongate and slender basal joint, it being twice or three times as long as the two following together; 3rd joint very deeply bilobed, the lobes quite slender; the clothing of the under side of the basal joint the same as the upper side, but that of the two following joints remaining as usual in the family.

MICRACANTHA, Munich Cat.

Micracantha nutans, n. sp. Fusco-nigra, ochraceo-griseoque tomentosa, setis erectis, tenuibus parcius adspersa; antennis nigris, griseo-variegatis, parcius nigro-setosis, fronte unicolore densissime ochraceo-tomentoso; prothorace transverso, punctis paucis magnis adsperso, irregulariter tomentoso, mox pone angulos anteriores utrinque tuberculato, basi subconstricto, margine basali discreto; elytris ochraceo-tomentosis, pone medium fascia irregulari albida sat distincta, punctis magnis profundis ad basin numerosis; pedibus tomentosis haud distincte variegatis. Long. 9—11½ mm., lat. 3½—4½ mm.

The setæ on the surface of this insect are pale on the sides of the body, although black on the back; the punctures of the elytra, though very distinct on the basal por-

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tion, become sparing and obsolete, the clothing consists of a somewhat mottled or patchy clay-coloured tomentum, more or less mixed with small white or grey patches, which, however, may be quite overlooked unless a careful examination is made; the pale and somewhat obscure transverse band on the elytra is placed just behind the middle, and consists of an oblique fascia on each, the sutural portion being rather nearer to the front than the marginal portion. The male seems to differ from the female only by a rather greater development of the legs and antennæ.

Three specimens of this species have been sent by Mr. Blackburn as No. 90; it is occasionally found by him in his house at Honolulu, and he considers it is probably attracted by light.

Oopsis, Munich Cat.

Lamia nutator, Fab. This species shows a well-marked sexual variation in colour, the pubescence in the female being clay colour, while in the male it is nearly white; the general colour of the surface in the female is more or less distinctly ferruginous, while in the male it is nearly black; in this latter sex the legs and tarsi are stouter than in the female.

This is one of the commoner insects in Oahu; it is the No. 22 of Mr. Blackburn's parcels. Fairmaire has described three other species from Tahiti, but has given no differential characters, and it may perhaps prove that they are not sufficiently distinct from the common Fabrician species, which is reputed to occur also in Australia.

Lagochirus, Munich Cat.

Cerambyx araneiformis, Lin. I have received three individuals as No. 89 from Mr. Blackburn, which must be referred to this species, although they are of very small size (13 to 17½ mm. long.), and the dilatation and clothing of the male anterior tarsi and tibiæ is but little different from what exists in the female. This species is in tropical America one of the commonest and most widely-distributed Longicorns; it has been recorded by Fairmaire as occurring in Tahiti, without any remark as to a diminution in its size there.

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XX. *Notes on Brazilian Entomology.* By Dr. Fritz Müller.

[Read June 5th, 1878.]

Odours emitted by Butterflies and Moths.

Two years ago I ventured to suggest* that all those various pencils, tufts or manes of hairs, all those chalky, silky or velvety spots of peculiar scales, as well as the recurved margins or other pouches enclosing pale buff or white down, which distinguish the wings of the male sex in many butterflies, might be odoriferous organs. This suggestion might then have been justly censured as too rash, being founded on the actual observation of odours in four species only, and I felt, of course, the necessity of testing this view by examining as to their odours all living butterflies I might be able to procure. I will here give the results hitherto obtained, enumerating those species† in which distinct odours could be perceived, and I hope the facts to be given will fully justify my suggestion.

Odours, as well as colours, may have been acquired by butterflies either for protection or as an attraction between the sexes. Protective odours appear to be in most cases equally strong in both sexes, or sometimes stronger in the females; they may exist in the caterpillar as well as in the perfect insect. When capable of voluntary emission, they are emitted as soon as the animal fears some danger, *e. g.*, when it is seized, and this may in some cases serve to distinguish them from sexual odours.

Sexual odours may be divided into two classes.

Firstly, those which give notice to the opposite sex of the existence of, and lead it the way to, the odoriferous animal. Such odours must exist in many female moths which attract the males from great distances. Among butterflies the males appear to be guided more by the colour than by the odour of their females.

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* Jenaische Zeitschrift für Naturwissenschaft, xi. p. 99.

† I am much indebted for the names of the butterflies mentioned in this paper to Prof. A. Gerstaecker and Dr. O. Staudinger.

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Secondly, those odours which do not serve as a guide, but as an excitement to the opposite sex. They appear to be by far more frequent in the males, though occurring also in some females. Odours of both classes will of course be agreeable to the attracted or allured sex: but in the first class the odour of the female is agreeable to the male because it is the odour of his female; while in the second class the odour emitted by the male is agreeable to the female, males with that peculiar odour having been preferred. The two classes may, of course, graduate into each other.

Colours, whether acquired as an attraction by the males or for the sake of protection by the females, are often transmitted to the opposite sex; with sexual odours of butterflies this seems but very seldom to be the case.

I shall not enter into minute descriptions of the odoriferous organs,* nor mention those very numerous species, which, though evidently possessing such organs, emit odours too faint for human noses; the only object of this paper being to state that there are a large number of male butterflies provided with special organs for the production and emission of peculiar odours.

BUTTERFLIES.

Family 1. NYMPHALIDÆ.

Subfamily 1. DANAÏNÆ.

A. *Danaïs group.*

Danaïs Erippus, *Danaïs Gilippus*,† *Lycorea* [sp.?] and *Ituna Ilione* have a pair of finger-like hollow processes at the end of the abdomen, into which they can be retracted; they bear a tuft of black hairs, radiating in every direction and emitting a rather disagreeable odour, when the processes are fully protruded. This odour is extremely strong in *Lycorea* and *Ituna*, less so in *D. Gilippus*, and rather faint in *D. Erippus*, differences exactly

* A series of papers describing odoriferous organs of various butterflies and moths have been sent for publication to the "Archivos do Museu Nacional do Rio de Janeiro."

† *Kirby* (Synon. Catal. of Diurn. Lepid. 1871, p. 7) doubts whether *D. Gilippus* may not be a variety of *D. Erippus*. But the caterpillars are quite different; those of *Erippus* have two, those of *Gilippus* three, pairs of "tentacles." The microscopical structure of the "sexual spot" of the male also shows considerable differences.

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corresponding to the different sizes of the tufts in the several species. The male of *Ituna* sometimes protrudes his tufts, when he is seized, so that in this butterfly the odour may serve both to repel enemies and to allure females. The well-known "sexual spots," or rather pouches, on the first median nervure of the hind wings of *D. Erippus* and *Gilippus*, which are much larger in this latter species, appear to be, by their microscopical structure, scent-producing organs; but as they open only by a narrow slit, odours could hardly be freely emitted. There is one curious circumstance, which may perhaps throw some light on their as yet very doubtful function; the scales, though perfectly preserved everywhere else, are often wanting at the entrance of the pouch, as if they had been scoured away by something introduced into the slit. It would be worth while to see whether this be the case with other species of *Danaïs* also. Might not the tufts be introduced into the pouches to be impregnated there with odoriferous matter?

B. *Ithomia group.*

The males have a tuft or pencil of long hairs near the anterior margin of the hind wings,* which in all our species emits a more or less distinct odour. The odour is rather strong and most agreeable, resembling vanilla, in *Dircenna Xantho*, rather faint in *Ceratinia Eupompe* and *Ithomia Sylvo*; it is still more so in *Mechanitis Lysimnia*, where I perceived it distinctly in but few males. In *Thyridia Megisto* the odoriferous tuft is not limited to the male sex; it exists in the females also, but the hairs are shorter and less numerous and the odour emitted is much fainter than in the males. The males have a well-defined brown spot, covered by the tuft; this is hardly distinguishable in the females. As the tuft exists in all the males of the group—which contains about a dozen of genera with more than two hundred species—as it is wanting in almost all the females, and as in *Thyridia Megisto* it is much less developed in the female sex, there can, I think, hardly be any doubt that it has been acquired as a sexual attraction by the males of the common

* There are two widely-separated tufts in the male of a small species of this group, resembling in size and colour *Cyllopoda dichroa*, one of our *Glaucopidæ*.

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progenitor of the group, and that it has been but recently transmitted to the females of *Thyridia*.

Subfamily 2. Satyrinæ.

The males of *Antirrhæa Archæa* have highly-developed odoriferous organs, and emit a strong odour; there is a most elegant mane of pale buff hairs on the under side of the front wings, and opposite to it the hind wings bear an odoriferous spot, which has caused a considerable modification of the neuration of the wing.* A second much smaller odoriferous spot exists in the angle between the submedian and internal nervures.

In the allied genus *Pierella* no trace of odoriferous organs could be found nor any odour perceived.

Subfamily 4. Morphinæ.

The wings of the males are known to be generally provided with tufts of hairs or with spots of peculiar appearance, which probably will prove to be odoriferous organs. The only genus, the wings of which are deprived of such organs, is *Morpho*. In compensation the males of all the species of *Morpho* which I have caught (*M. Hercules, Epistrophis, Adonis, Cytheris, Menelaus, Achilles*) are able to protrude from the end of the abdomen a pair of hemispherical bodies covered with short hairs, which produce a very distinct odour. In the splendid *M. Adonis* and the allied *M. Cytheris* this odour is most agreeable, resembling vanilla.

Subfamily 5. Brassolinæ.

Pencils of hairs, capable of being erected voluntarily, or spots of peculiar scales are present on the hind wings of most genera. Their position varies much, even within the limits of the same genus. In the males of various species of *Caligo, Dasyophthalma* and *Opsiphanes*, I found that very distinct odours were emitted by these pencils or spots, the odour being particularly strong in a species of *Dasyophthalma*.

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* See *Butler*, Catal. Satyrid. Br. Mus. 1869, Pl. V. fig. 3. In *Butler's* figure of the mane ("plaga pectinatim cirrata") the hairs appear to be directed backward, while the contrary is the case; they are inserted along the submedian nervure and directed forward.

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Subfamily 6. Acræinæ.

On crushing either sex of *Acræa Thalia*, a disgusting odour is perceived, which probably renders it unpalatable to most insectivorous animals; there appear to be no special organs for the emission of odours.

Subfamily 7. Heliconinæ.*

The butterflies of this subfamily also possess a disgusting odour, and both sexes are provided with special organs for its emission. In the male they are situated between the anal valves, in the female on the dorsal side of the end of the abdomen. The odours emitted appear to be generally stronger in the female sex.†

Subfamily 8. Nymphalinæ.

A. *Epicalia group.*

Unusually strong odours are emitted by the males of *Myscelia Opis* and *Epicalia Acontius*. Both of them have a large odoriferous spot on the upper side of the hind wings, and opposite to this a similar spot, covered by a mane of black hairs, is situated on the front wings of *Epicalia Acontius*. It is very remarkable that the odoriferous organs, which are so highly developed in *Epicalia Acontius* are completely wanting in *Epicalia Numilia*, and it is yet more remarkable that they closely resemble in various particulars those of *Antirrhæa Archæa*, though they were no doubt independently acquired in both species. In both these butterflies the posterior margin of the front wings and the anterior margin of the hind wings are much dilated; in both of them a mane of long hairs is inserted on the under side of the front wings, along the submedian nervure, covering an odoriferous spot (which is well developed in *Epicalia*, but most rudimentary in *Antirrhæa*), and opposite to the mane there is a large odoriferous spot on the hind wings, the central part of which fills the angle between the two subcostal nervures, extending into the three adjoining cells

* I have lately shown (Stettin. Entomol. Zeitung, 1877, p. 492) that the genera *Colænis* and *Dione* cannot be separated from *Heliconius* and *Eueides*.

† For a full description of the odoriferous organs of the female *Heliconinæ*, see a paper in Zeitschrift für Wissenschaftliche Zoologie, vol. xxx. p. 167.

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of the wing. If we knew only these two species of *Nymphalinæ* and *Satyrinæ*, we should unhesitatingly assume that their odoriferous organs, situated on the same place, composed of the same parts, and in the same position, were inherited from common progenitors; and yet this would be a great mistake.

B. *Ageronia group.*

In the male of *Ageronia Arethusa* a rather strong odour is emitted by two large brown spots, situated between the wings, one on the under side of the front wing, occupying the basal half of the cell between the submedian nervure and first median nervule, the other on the upper side of the hind wings. The microscopical structure of the scales and the wing-membrane of these spots differs but little from that of the rest of the wings. In *Ageronia Amphinome* and *Feronia* neither odours nor odoriferous organs could be detected.

Didonis Biblis is, so far as odours are concerned, the most interesting of all butterflies that I know. The male is able to emit as many as three different odours. On seizing a *Didonis* of either sex, it protrudes on the dorsal side of the abdomen, between the fourth and fifth segments, a pair of hemispherical protuberances, covered with greyish hair-like scales and producing a strong, rather disagreeable odour. The male has a second pair of similar protuberances between the fifth and sixth segments of the abdomen, covered with white hair-like scales. These white protuberances he never exposes when caught; they emit an agreeable odour, comparable to that of heliotrope, and are of so elegant an appearance that they probably serve at the same time as an ornament. A very different musk-like odour is produced by a black spot, which is situated on the under side of the front wings of the male near the base between the median and submedian nervures. This odour is very faint; it is convenient to remove the abdomen before trying to perceive it. I may add that the hind wings of the male also have a very small greyish spot near the base, which is wanting in the female.

C. *Apatura group.*

A distinct odour issues from the tuft of black hairs which distinguishes the hind wings of the male sex of *Prepona Laertes* and several other allied species.

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Family 3. LYCÆNIDÆ.

It is well known that the males of very many species of *Thecla* have a "sexual spot" on the disc of the front wings, and that sometimes (*e. g.*, in the males of *T. Acmon*) the neuration of the wing is greatly altered by the presence of this spot. In the male of *T. Atys* an unusually strong odour is produced by this "sexual spot," and more or less distinct odours by various other species, the names of which I do not know.

Family 4. PAPILIONIDÆ.

Subfamily 1. PIERINÆ.

The front wings of the male *Leptalis Thermesia* have a chalky oval spot on their under side, and opposite to this there is a dark-brownish spot on the upper side of the hind wings. Both these spots emit a very strong odour, disagreeable to human noses, but probably not so to his females. A similar, though much fainter odour has been observed in the male *Leptalis Astynome* and *L. Melite.*

A very delicious perfume is produced on the upper side of the wings of the male *Daptonoura Lycimnia.* It is rather faint and often hardly distinguishable when the butterfly is caught. In this case it may easily be rendered distinct by keeping the living animal for some time with the wings closed. On the whole upper surface of the wings there are, among the ordinary scales, in the males of this species (as in many species of *Pieris, Hesperocharis, Archonias, Pereute,* &c.), numberless peculiarly-formed odoriferous scales or "plumules," as they were called by Bernard Deschamps. In *Daptonoura Lycimnia* these "plumules" are club-shaped and fringed with fine hairs at the end.

When a female of *Daptonoura Lycimnia* (and various other butterflies, *Callidryas, Anartia,* &c., behave in the same manner) is willing to admit a male, she expands her wings horizontally, lifts a little the end of the abdomen and exposes her copulating organs. Then the male is seen to hover above and to fly around her; but often, far from accepting the offer of the female, which, after a long courtship, finally surrenders herself to his wishes, he suddenly flies away without returning. What may be the cause of his thus abandoning her at the decisive moment?

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The only thing which he could not perceive, whilst chasing after the female, is that part of her sexual organs which is now for the first time exhibited to him. Now, these copulating parts of the female, when protruded, emit a peculiar odour, and it is probably the individual odour of the several females which determined the decision of the male. In *Daptonoura Lycimnia* this odour is rather faint, though quite distinct. It is very different from that emitted by the wings of the male.

The male of *Daptonoura Ilaire* is also provided with "plumules" on the upper side of the wings, but no odour was here perceived. At the same time he has a tuft or pencil of brown hairs at the end of the abdomen, on the ventral side. This tuft is not retractile, but applied to the ventral margin of, and partially hidden between, the anal valves; it may be made to radiate in every direction and then emits a rather strong odour. This tuft of hairs exists in the female also, but it is much shorter, and I could not perceive any odour produced by it.

The males of most species of *Callidryas* have a chalky spot on the upper side of the hind wings, near the base and the anterior margin; sometimes it is covered by a mane of long hairs, and sometimes the front wings also have a similar spot opposite to that of the hind wings. I perceived a musk-like odour issuing from this spot and mane in *Callidryas Cipris*, *C. Argante*, and *C. Trite*. It is unusually strong in *Cipris*, very distinct in *Argante*, rather faint in *Trite*. In several males of this last species which I caught two years ago I could not perceive any odour, while I find it to be quite distinct in all those which I have lately examined. Are those butterflies producing a more powerful perfume in 1878 than they did in 1876, or have my olfactory organs, by continual exercise, become more acute in the meantime? According to Boisduval, the chalky spot is wanting in the male *Callidryas Eubule*, and, indeed, it may easily be overlooked through hardly differing in colour from the rest of the wing; but it exists, and is easily discovered by its opacity after denuding the wing. It emits a faint musk-like odour.

The females of *Callidryas Argante*, *Eubule*, and probably also of other species, show on either side of the protruded copulating organs a small, shining, circular spot, from which a very strong peculiar odour issues, in which some volatile acid seems to predominate.

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Subfamily 2. PAPILIONINÆ.

When special organs for emitting odours are developed in the males of this subfamily, they are placed along the anal margin of the hind wings, which is then usually recurved. It can be expanded, and the odoriferous organs exposed by moving the wings strongly in a forward direction. In some species a very strong odour is emitted by the upper side of the wings of the male without any special organs having been found (but I must add, that I have not yet compared microscopically the wings of the two sexes). This is the case with *Papilio Polydamas* and *Hyperion*. In *P. Polydamas* there appear to be two sets of males emitting equally strong, but quite different, odours. This would be analogous to the case of the two sets of differently-coloured females in some species of this genus. *P. Polydamas* is generally the most common of our *Papilios*, but in the last summer it has been rather rare, and I have examined but a small number of living males; thus, on examining a larger number, intermediate odours may be found.

In *Papilio Scamander* or *Grayi** the black hairs existing in both sexes on the upper side of the hind wings, are much more developed near the anal margin in the males, which emit a strong, most agreeable odour, issuing from these hairs; the females are scentless.

In the male *Papilio Protesilaus* the hairs near the anal margin of the hind wings are developed to a long black beard, which is hidden by the recurved margin of the wing, and exhales, when uncovered, a very strong, or rather disagreeable, odour. Beard and odour are wanting completely in the female sex.†

In the male *Papilio Nephalion* the pouch formed by the recurved anal margin of the hind wings is filled with an astonishing quantity of white silky down. In a male

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* This butterfly visited in large numbers the flowers of a red *Salvia*, in the highlands of the province of Santa Catarina, near S. Bento. Some specimens agreed with *Boisduval's* description of *P. Scamander*, others with that of *Papilio Grayi*, and most of them were intermediate between the two.

† *Felder* (Species Lepidop. 1864, p. 57) states that among a large number of specimens of *Papilio Protesilaus*, *Agesilaus* and *Telesilaus* he could not find any female. In 1876 *Pap. Protesilaus* (var. *Telesilaus*) was extremely common, both on the river Itajahy and on the highlands of Curitibanos, and I think I have caught more than a hundred specimens, among which there were but two females.

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which I lately caught I perceived a faint agreeable odour on opening the pouch.

Family 5. HESPERIDÆ.

The *Hesperidæ* agree with moths in many particulars, which are not to be found in any other butterflies. Thus, as in many moths, the tibiæ of the hind legs are provided in the males of various species with a large pencil of long hairs. It can be hidden in a furrow on the ventral side of the body, between thorax and abdomen. In *Plesioneura Eligius*, and in a species of *Achlyodes*, I perceived a very faint odour issuing from the pencils when they were expanding.

MOTHS.

In butterflies, as we have seen, the odoriferous organs of the males in most cases are developed on the wings; in but few genera (*Danais*, *Lycorea*, *Ituna*, *Morpho*, *Biblis*) they were found on the abdomen, and, in some *Hesperidæ*, on the hind legs. With moths the case appears to be very different. Though not wanting on the wings, these organs seem to occupy much more frequently the abdomen or legs.

A musk-like odour is known to be produced by several male sphinx moths; I have observed it in *Macrosilia Antæus* and two other species. It is emitted by two pencils of pale hairs on the ventral side of the abdomen, which can be hidden in longitudinal grooves on the first two abdominal segments. To see them in the living male he must be held with the ventral side turned upward, so that he can freely move his wings. As soon as he begins to flutter, the pencils will expand, and when the wings cease to move, they will be laid down again into their grooves.

The males of the *Glaucopidæ* are provided with two long hollow retractile filaments, generally beset with hairs, which they can protrude from the end of the abdomen, on the ventral side; sometimes they exceed the body in length, and are then rolled into an elegant helix. They emit, in most cases, a distinct odour, which is very strong in some species (*e. g.*, *Belemnia inaurata*). Two similar filaments, producing a strong odour, exist in the male of a *Cryptolechia*. I have seen retractile pencils, tufts of hairs, or hairy protuberances, some of them emitting distinct

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odours, at the end of the abdomen of various other male moths, of which I do not know the names.

Pencils or tufts of hairs appear to be of rather frequent occurrence on the legs of male moths, *e.g.*, among the *Erebidæ* and *Geometridæ*, and in two or three cases odours were observed to issue from them.

In one of our largest *Erebidæ* the tibiæ of the hind legs are much dilated in the male, and densely covered with peculiar hairs, capable of being voluntarily erected; they emit a faint but distinct odour.

As I know as yet but a very insignificant part of our moths, a vast number of other odoriferous contrivances may be expected to be found among the extremely numerous species of these insects.

*Sounds made by Butterflies.**

I know here four species of *Ageronia* (*Feronia*, *Fornax*, *Amphinome* and *Arethusa*), all of which are rather common in certain localities where their food-plants (*Daleshampia*) abound. I have frequently heard the noise made by them and can fully confirm Mr. Darwin's statement, that this noise is produced, almost exclusively, when two are chasing each other. Sometimes a short, clicking noise is made, when an *Ageronia* is caught in the net. On October 30th, 1876, at the mouth of the Rio Trombudo, a tributary of the Itajahy, I saw two butterflies chasing each other, which produced a loud clicking noise, and settled from time to time in the manner of *Ageronia*, with the wings expanded horizontally, on dry stems of *Tagnara* (bamboo). I, of course, imagined them to be some species of *Ageronia*, but after having succeeded in catching one of them, found that it was *Eunica Margarita*. I may observe that the neuration of the wings of that butterfly bears a rather close resemblance to that of *Ageronia*, so that, indeed, it may be more nearly allied to that genus than is generally assumed.

On February 21st, 1877, at the foot of the Serra de Itajahy, I heard a noise resembling that of *Ageronia*, but

* The following notes are supplementary to a paper by Mr. Meldola, entitled "Entomological Notes bearing on Evolution," in Ann. and Mag. of Nat. Hist., Feb. 1878.

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rather louder, produced by two small brown butterflies, which seemed to be *Euptychiæ*, but which I did not succeed in catching.

It has been suggested that the production of sound by *Ageronia* is connected with the existence of a small membranous sac at the base of the front wings, which in the living insect is filled with air when the costal nervure is compressed. But this sac also exists in several other butterflies, which seem to be incapable of producing sounds, *e.g.*, *Pyrrhogyra Edocla* and *Callicore Eluina*. If I remember rightly, in *Eunica Margarita* the sac is wanting.

Insects distinguishing Colours.

In flowers with changing colours, most of the visiting insects perfectly distinguish the first honey-filled flowers, as I have ascertained by a long series of observations on some species of *Lantana*. In some species the difference in colour between the fresh flowers and the older ones is but very trifling, a small yellow circle surrounding the entrance to the tube of the corolla during the first day and disappearing afterwards.

A specimen of *Victorina Frayja* was lately observed settling on the flower of a rose-tree painted on a wall; the painter was much pleased by seeing his skill thus acknowledged by that butterfly.

Mimicry.

In some years, as I stated in 1871, *Mechanitis Lysimnia* is here hardly more common than the imitating *Leptalis Astynome;* but in most years *M. Lysimnia* is extremely abundant and *L. Astynome* rather rare.

When I descended in a canoe the western branch of the Itajahy (December 16th, 1876), small white butterflies were very common on the banks of the river: all appeared to be of the same species. I caught about a dozen, and on examining them at home found them to be *Leptalis Nehemia*, which so wonderfully mimics a *Pieris*, that even Boisduval was deceived and described it as *Pieris Nehemia*. Now, in his case, the model must have been either by far more rare than the copy, or entirely wanting.

On the Itajahy we have three species of *Eueides*, viz., *E. Pavana, Isabella* and *Aciphera;* all of them are rare, and *E. Pavana* extremely so. This last species closely resembles *Acræa Thalia; E. Isabella* resembles *Mechanitis Lysimnia* and *Heliconius Eucrate*, while *E. Aciphera*

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mimics *Colænis Julia*. I, therefore, formerly thought that the three rare species of *Eueides* mimicked the three common species of *Acræa*, *Mechanitis* and *Colænis*. Afterwards, after finding that the several species of *Eueides* possess a very strong and repugnant odour, I had become somewhat doubtful, and at São Bento I found that *E. Aciphera* was extremely common, so common, indeed, that repeatedly I caught as many as eight specimens in the net at once, whereas *C. Julia* was so rare that I have only seen two or three specimens altogether. Thus, judging by their relative abundance, an observer on the Itajahy might consider *E. Aciphera* to be a mimic of *C. Julia*, while an observer at São Bento might take *C. Julia* to be a mimic of *E. Aciphera*.

Correlation of Habit with Protective Resemblance.

Any number of cases might be given. The case which has most struck me is that of the caterpillar of a small moth belonging to the curious Cochliopod group. This caterpillar has long lateral processes, overlapping each other, and imitates in a truly wonderful manner a dry leaflet of the food plant *Cassia multijuga* with the apical half gnawed off. Now, when gliding along slowly and smoothly, as Cochliopod larvæ are accustomed to do, it has the strange habit of making curious waving movements from side to side, just as a dry leaf moved by the wind. A dry leaf marching in a straightforward manner would be a strange thing, and might rouse the attention of some intelligent bird, whilst it would not look at a leaf moved by the wind.

Another curious instance is that of the caterpillar of our Brazilian "leaf-butterfly" (*Siderone strigosus*); when very young it feeds on the tips of the lanceolate leaves of a *Casearia*, sparing the mid rib, on which it rests. This habit of resting on the denuded ribs of leaves is common to various young caterpillars (*Protogonius*, *Adelpha*, *Gynæsia*), and they are thus very well protected. When somewhat larger, the caterpillars of *Siderone strigosus* (and of *Siderone Idæ*, which live on the same plant) bite small pieces from the leaf, fastening them to the mid rib, with their margins rolled in, and the brown colour which these bits of leaf soon assume excellently conceal the small brown caterpillar which sits between them; at last the full-grown larva itself perfectly imitates a rolled dry leaf.

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XXI. *New* Coleoptera *from Australia and Tasmania, in the Collection of the British Museum.* By Chas. O. Waterhouse.

[Read July 3rd, 1878.]

The British Museum Collection has lately received some additions from Tasmania, which have led me to examine some groups of Lamellicorns and Heteromera with a view to their determination. Some interesting new genera and new species have thus been brought to light, of which I here append descriptions.

RUTELIDÆ.

Saulostomus, gen. nov.

Mentum narrowed at the insertion of the palpi, with the anterior margin truncate. Labrum with the margin gently arcuate and not produced in the middle. Tarsi rather short and robust, the first four joints subequal, scarcely as long as broad, the first joint a little the longest. Claws simple. Antennæ 10-jointed. Elytra with a membranous border.

Closely allied to *Schizognathus*, but without the mesial production to the mentum and labrum. It differs from *Amblyterus* in having short tarsi with simple claws. *Schizognathus* and the other genera of *Brachysterninæ* have a mesial projection to the labrum, the absence, therefore, of this would seem to exclude the present insect from this subfamily. There is, however, no other place for it, and it must be regarded as a slightly aberrant form. The presence of the membranous border to the elytra exclude it from the true *Rutelidæ*, and the 10-jointed antennæ from the *Anomalinæ*.

Saulostomus villosus, sp. n.

Piceus, nitidus, fulvo-pubescens; corpore subtus pedibusque flavo-testaceis; thorace transverso, æneo-tincto,

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laxe sat fortiter punctato; elytris brevibus, quadratis, striis nonnullis geminatis sat fortiter impressis, interstitiis irregulariter punctato-rugosis.

Long. 6½ lin.

Clypeus pitchy-yellow, rather thickly and distinctly punctured, quadrangular, a little transverse, the margins reflexed, finely margined with brown. Thorax one-third broader than long, convex, shining, clothed with long hair, not very thickly but rather strongly punctured, the sides gently rounded, the base sinuate on each side. Scutellum with a few punctures. Elytra with four pairs of striæ, those at the sides rather obsolete, the surface of the interstices very uneven. The under side of the insect is clothed with long, thick pubescence. The points of the teeth on the anterior tibiæ and the spines on the legs are pitchy.

Hab.—Tasmania; Melbourne.

HOMOTROPUS, gen. nov.

Characters of *Schizognathus*, but with the clypeus concave, deflexed and entirely rounded on the three free sides. Antennal club composed of three very long lamellæ. Labrum very short and transverse, with a small but prominent projection in the middle. Mentum narrowed in front of the insertion of the palpi and emarginate in middle of the anterior margin. Tarsi short and stout. Thorax with sides and base margined.

The principal character here is the emargination of the margin of the mentum. In this respect there is an approach to *Amblyterus*, but that has slender tarsi, &c. The elytra do not appear to have any membranous border; it should, therefore, be placed at the commencement of the *Adoretinæ*, according to Lacordaire's arrangement; but, as in all other respects, in the general form, in the form of the palpi, it agrees better with the *Brachysterninæ*, I prefer placing it at the end of that family.

Amblochilus, Blanch., is placed with doubt by Lacordaire at the end of the *Brachysterninæ*, the difficulties being that Blanchard says nothing about the labrum, and states that the antennæ are 9-jointed. The labrum is transverse, with a small mesial tooth-like projection. The antennæ appear to me to have only 9 joints; the 7th joint is slightly indicated, but is not, I think,

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separate from the 6th. It appears to me to be correctly placed as Lacordaire has it, and is closely allied to *Homotropus*, above described, agreeing with this also in having no membranous border to the elytra. It is the internal claw that is the more slender, not the external, as stated by Blanchard.

Homotropus luridipennis, sp. n.

Niger, nitidus, breviter oblongus; clypeo rotundato, creberrime subtiliter ruguloso; fronte irregulariter punctulatâ; thorace longitudine $\frac{2}{3}$ latiori, convexo, nitido, laxe punctulato, lateribus sat rotundatis, marginatis, basi utrinque leviter sinuato, marginato; scutello utrinque punctato; elytris luridis thorace vix latioribus, latitudine haud longioribus, lineis nonnullis parum elevatis, interstitiis crebre fortiter rugoso-punctatis; antennis pallide piceis; pedibus piceis; corpore subtus longe piloso.

Long. $5\frac{1}{2}$ lin.

This insect forcibly reminds one of some of the smaller *Macrophyllæ* among the *Melolonthidæ*.

The elytra are very rugose; each elytron has several well-marked channels, those on the dorsal region being in pairs with a narrow ridge between them; the more elevated parts as well as the extreme margin are brown. The clypeus has a slight notch, or emargination on each side.

Hab.—Australia (Argent).

MESYSTŒCHUS, gen. nov.

Mandibles simple, straight on the inner edge, rounded on the outer, concave above. Labrum free, slightly transverse, rounded in front, beset with bristle-like hairs. Mentum elongate ovate, narrowed at the apex, thickly beset with long stiff hair; palpi short, the apical joint narrowed towards the apex. Clypeus entirely rounded in front, margined. Antennæ 10-jointed, the 6th and 7th transverse, the 8th, 9th and 10th forming a long, stout, slightly-arched club. Tarsi rather long and slender; the claws subequal, the inner one a trifle shorter than the outer; the larger claw of the anterior pair split before the apex.

This genus is closely allied to *Amblyterus*, but differs in having the mentum more regularly narrowed in front and not truncate, and only the larger claw of the anterior

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tarsi is split, whereas the large claw to all the tarsi is split in *Amblyterus*. Lacordaire says that this claw is not "fissile" in the anterior pair, but this is evidently a mistake; he states, also, that the labrum is very prominent in the middle. I have only dissected one specimen, and in that it is not prominent at all in the sense in which the term is used with regard to the species of this family. I do not trace any membranous border to *Mesystœchus*, and it is so slight in *Amblyterus* that it is seldom visible.

Mesystœchus ciliatus, sp. n.

Oblongus, convexus, nitidus, flavo-piceus; fronte thoraceque nigro-æneo variegatis; scutello piceo, punctulato; elytris fortiter striato-punctatis, apice crebrius rugoso-punctatis, suturâ marginibusque piceis; antennis pedibusque piceis, femoribus flavo-piceis.

Long. 4½ lin.

Clypeus densely rugulose, with the fine reflexed margin pitchy-black. Head blackish, with a spot in front yellowish, thickly and rather strongly punctured, less so on the vertex. Thorax one-third broader than long, convex, pitchy-yellow, not very thickly but rather strongly punctured; the sides arcuate, a mesial line and an irregular patch on each side (all sub-confluent) bronzy-black. Elytra a trifle broader than the thorax, a little longer than broad, with two double lines of rather strong punctures on the dorsal region of each, and four lines on the sides; the broad interstices with strong punctures, which have a tendency to form irregular lines. The margins are beset with short stiff hairs. The under side is variegated with brownish-black, moderately pubescent.

Hab.—Moreton Bay (Diggles).

DIAPERINÆ.

Ennebœus, gen. nov.

Labial palpi widely separated at their base, the apical joint rather large and acuminate at the apex. Internal lobe of the maxillæ unarmed, apical joint of palpi arcuate on the inner side. Mandibles bifid at the apex. Labrum moderately prominent. Eyes oblong-ovate when viewed laterally, nearly round when viewed from above, coarsely granular. Antennæ a trifle longer than head and thorax together, rather slender, 2nd joint a little shorter than the

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1st, the 3rd joint elongate, the 4th to 6th diminishing in length, 7th a little longer than broad, 8th as broad as long, 9th and 10th forming distinct but not a large club. Thorax transverse, narrowed in front, lobed in the middle of the base. Elytra convex, at the base the same width as the thorax, arcuate at the sides; the epipleural fold gradually narrowing to the apex, a little concave at the extreme base, slightly convex posteriorly, not separated from the elytra by a sharp edge. Tarsi slender, moderately long, pubescent below, the basal joint of the posterior pair long, as long as the 2nd, 3rd and half the 4th taken together. Prosternum horizontal, parallel. Mesosternum sloping anteriorly.

This insect is regularly oval, convex and finely pubescent. It appears to be allied to *Platydema*, but the antennæ are more like those of *Heterophyllus*. I think it should be placed before this latter.

Ennebœus ovalis, sp. n.

Ovalis, convexis, piceo-niger, subtiliter pubescens et punctulatus; antennis pedibusque piceis.

Long. vix 2 lin.

Regularly oval, convex, very finely pubescent. Head, thorax and elytra very thickly and extremely finely punctured; the elytra not punctate-striate. Thorax at the base twice as broad as long, narrowed in front, the anterior angles very little prominent, blunt, the sides almost rectilinear, finely margined, the base gently lobed in the middle. Scutellum small and semicircular, only seen with great difficulty. Elytra at the base fitting close to the base of the thorax; the sides arcuate, continuous in outline with the sides of the thorax, broadest a little before the middle, finely margined, pitchy at the apex.

Hab.—Tasmania.

This insect has somewhat the form of *Rhizobius litura* among the *Coccinellidæ*, but the elytra are still more exactly adapted to the base of the thorax.

MORDELLIDÆ.

Tomoxia flavicans, sp. n.

Nigra, supra dense flavo-sericea; elytris apice nigris; corpore subtus plus minusve sericeo.

Long. 3 lin.

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Head very broad. Antennæ rather short, the 5th to 10th joints broad, the 7th to 10th a little broader than long, narrowed at their base. The mesial lobe of the base of the thorax is rather broad and nearly straight. The elytra are moderately attenuated posteriorly, clothed with yellowish pubescence, with a transverse band across the middle, and the apex blackish. The band on the elytra ascends a little on the suture. The first four joints of the antennæ are slightly pitchy. The under side of the insect is clothed with yellowish pubescence, the sides of the metasternum and abdomen being dark, with a silky spot on the side of each segment.

Hab.—Clarence River, E. Australia.

Mordella aterrima, McLeay (Trans. Ent. Soc. N. S. Wales, ii. p. 309). "Length, 3 lines. Elongate, satiny black, with a white spot on the side of the basal segment of the abdomen."

I know of only one Australian species which agrees with this brief description, and that is a *Tomoxia*.*

Hab. Moreton Bay.

Mordella multiguttata, sp. n.

Atra, velutina; capite, pectore femoribusque flavo-griseo-pubescentibus; thorace guttis undecim (5 ad marginem anticam, 2 discoidalibus, et 4 basalibus), singulo elytro maculis septem (2 basalibus, 3 ante medium, 1 majore ad medium, altera ante apicem), abdomineque maculis plurimis flavo-tomentosis.

Long. 4—5¼ lin.

Closely resembles *M. leucosticta*, Germ., and of the same form and size. The thorax has eleven yellow spots, five on the anterior margin, of which the central one is cuneiform and the two on each side are joined together on the margin: there are two ovate spots on the disk, and four on the posterior margin, the two outer ones being much the larger. Each elytron has seven spots, one close to the scutellum, one close to it in the middle of the base, three small ones arranged in a triangle ∴ before the middle, a large spot in the middle close to the suture, and a large subapical one in the form of an oblique S. There are also two large yellow spots on

* *Mordella Mellissiana*, Woll., from St. Helena, is a *Mordellistena*.

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each side of the abdominal segments, and one on each side of the base of the aculeus. The antennæ and palpi are pitchy at the base.

Hab.—Moreton Bay.

I think that there is no doubt that *M. abdominalis*, Blessig (1861), and *M. octomaculata*, McLeay (1872), are synonyms of *leucosticta*, Germ. (1848). *M. 14-maculata*, McLeay, is easily distinguished by the narrow transverse fascia across the disk of the thorax.

Mordella communis, sp. n.

Nigra; capite thoraceque flavo-griseo-sericeis hoc vittâ medianâ punctoque utrinque nigris; scutello flavo-griseo; singulo elytro margine basali angustissime guttisque septem griseo-sericeis; corpore subtus plus minusve griseo-sericeo.

Long. 2⅓ lin.

The elytra have the extreme base narrowly bordered with yellowish-grey pubescence, from which are emitted three very short stripes (or elongate spots), one close to the suture, one in the middle of the base, and the third on the shoulder. A little way from the base there is a small round white spot, and about the middle are two irregular spots, the one nearer the suture, a little higher than the outer one; near the apex, and close to the suture, is a larger white spot. The grey pubescence on the under side forms a white stripe close to the margin of the elytra on the meso- and metasterna; there is also a spot on the middle and one at the side of the basal segment of the abdomen, and a smaller one on the side of the second and of the third segments. The anterior femora are obscure pitchy.

Hab.—N. W. Coast of Australia and Tasmania.

The Tasmanian specimens do not seem to differ from the type specimen, but there are two examples in the Museum Collection from Sydney, which appear relatively a trifle shorter and with less broad thorax; the markings are more tinged with yellow, relatively larger, and the inner one of the pair in the middle of the elytra is more distinctly V-shaped; these may prove to be a distinct species.

Mordella elegans, sp. n.

Fusco-nigra, latior; capite thoraceque aureo-sericeis, hoc vittâ medianâ maculâque utrinque nigris; scutello

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aureo-sericeo; singulo elytro maculis quinque, unâ basali brevi juxta suturam, altera in medio basis, duabus fere ad medium, altera ante apicem majore aureo-sericeis; corpore subtus plus minusve aureo-sericeo; labro, antennarum basi, palpis, pedibusque anticis piceis.

Long. 2 lin.

Resembles *M. communis*, but is relatively shorter and more robust, and the spots on the elytra are much larger. The golden pubescence on the elytra forms a very narrow border along the base, an elongate spot on each side of the suture beneath the scutellum, an elongate spot in the middle of the base, and there is a very small spot above the shoulder; about the middle of each elytron there are two spots, the outer one round, the inner one elongate and oblique (nearly forming, with its fellow on the other elytron, a V-mark); there is also a large spot before the apex. The whole of the under side of the insect is clothed with yellow pubescence, except a spot on the side of the metasternum and the sides of the abdomen, which, however, has a spot on the side of each of the segments. The anterior legs, and the intermediate femora, the labrum, base of the antennæ and palpi are pitchy.

Hab.—S. Australia (Bakewell).

There is a specimen in the Museum Collection, also from S. Australia, which differs from the above in having the scutellar spot replaced by a fine sutural line, which joins the inner of the two spots at the middle of the elytra. This may be a mere variety of *elegans*.

Mordella trivialis, sp. n.

Elongata, nigra; capite thoraceque flavo-sericeis; elytris humeris maculâ lunatâ flavo-sericeâ, fasciâ medianâ tenui fortiter dentatâ, maculâque subapicali albidis; corpore subtus plus minusve griseo-sericeo; antennarum basi, palpis, pedibus anterioribus femoribusque intermediis piceis.

Long. 2½ lin.

This species much resembles *M. communis*, but is a little more elongate, and the markings on the elytra are different. Head and thorax uniformly clothed with yellow pubescence. Elytra with a short lunate spot on the shoulder; there is a trace of white on the suture below the scutellum; there is a very narrow white fascia a little before the middle of the elytra; it commences on the

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margin, some way from the shoulder, is directed obliquely downwards, then turns at an acute angle obliquely upwards (not to a level with the starting point), and then turns at an acute angle downwards, and joins the suture. The aculeus is very long.

Hab.—S. Australia (Bakewell).

Mordella ornata, sp. n.

Nigra, aureo-sericea; thorace medio paulo infuscato; elytris lateribus apiceque fusco-nigris, fasciâ ante apicem aureo-sericeâ.

Long. 2¼ lin.

Black, but almost entirely clothed above and below with golden pubescence. The thorax has the disk rather darker. Elytra with the margins and apical third brownish-black, with a fascia composed of four united spots (two on each elytron) at a little distance from the apex, the outer spots the smaller. The abdomen has the usual sub-lateral dark spots.

Hab.—N. W. Coast of Australia.

This species is a moderately robust one, not very much attenuated posteriorly. The head is not very broad and is moderately narrowed in front; the antennæ are rather slender and have the 5th to 10th joints about as long as broad. There is the appearance of a small dusky spot within the shoulder, and a dusky stripe parallel with the suture, on one of the examples, but are wanting in the second.

Note.—There is in the Museum Collection a single specimen closely resembling the above, but probably a distinct species. The thorax is partially clothed with golden pubescence, with a broad sutural stripe and a spot on each side obscure fuscous, all ill-defined. The elytra are fuscous-black, with a fine sutural line and an oblique stripe extending from the shoulder to about the middle of the elytron golden. Length 2 lin.

Mordella bella, sp. n.

Fusco-nigra, angusta; capite thoraceque aureo-sericeis; elytris sub-purpurascentibus, singulis maculâ juxta basin, suturæ parte basali, fasciisque duabus angustis (unâ ante medium dentatâ, alterâ ante apicem), aureo-sericeis; antennis, palpis, pedibus anterioribus, femoribusque intermediis pallide piceis.

Long. 1¼ lin.

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The antennæ are pale, but dusky at the apex. There are no distinct markings on the thorax. The elytra have a purple gloss; on each there are the following golden markings: an elongate spot on the suture at the scutellum, a triangular spot in the middle of the base (extending a little over the shoulder), a narrow fascia just before the middle, commencing on the margin, is directed obliquely backwards for a short distance, and then turns obliquely at a right angle forwards to a level with the starting point, and then turns again backwards at an acute angle and joins the suture; there are also two lunate spots at some distance from the apex, which, with the corresponding pair on the other elytron, form an interrupted fascia.

Hab.—S. Australia (Bakewell).

This species much resembles *M. elegans*, but is much smaller and narrower, and has two spots at the apex of each elytron, instead of one, &c.

There is a specimen in the Museum which closely resembles this species, but has the spot in the middle of the base of the elytra more elongate; the spot below the scutellum divides posteriorly, and the mesial band appears more strongly zig-zag; the thorax also is obscurely marked with fuscous, and the anterior legs are less pale. This may be a mere variety. It measures $1\frac{1}{2}$ lines.

There are also two examples which resemble the above, but which are black, with the suture of the elytra only golden-pubescent; the base of the antennæ, the palpi and the anterior legs are pitchy. Long. $2\frac{1}{2}$ lin.

These are probably a distinct species, but the examples being in bad condition I do not venture to describe them.

Mordella ruficollis, sp. n.

Nigra; capite thoraceque flavo-rufis; elytris basi angustissime, maculâ parvâ juxta basin, suturâ usque ad medium, fasciâ medianâ angustâ litteram W formanti, maculâque ante apicem griseo-albo-sericeis; antennarum articulo basali, palpis, femoribusque anticis rufo-flavis; corpore subtus pedibusque plus minusve griseo-sericeis.

Long. $1\frac{3}{4}$ lin.

Head and thorax pale red, with yellow silky pubescence. Antennæ rather long, the 4th to 10th joints distinctly longer than broad. Scutellum silvery. Elytra black, with the following silvery-white markings; the base narrowly bordered with white, with an elongate spot in

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the middle of the base of each elytron joined to the basal border; suture white as far as the middle, where there is a narrow fascia in the shape of a well-marked W; near the apex there is a second fascia composed of two lunate marks, one on each elytron. The whole of the under side and the legs are more or less clothed with whitish-grey pubescence, which is rather more white below the shoulders and on the sides of the abdominal segments.

Hab.—Tasmania (Atkinson).

Mordella limbata, sp. n.

Nigra, vix purpurascens, supra aureo-sericea; thorace lineâ medianâ punctoque utrinque nigris; elytris marginibus, apice, punctoque reniformi utrinque ante apicem nigris; corpore subtus femoribusque griseo-aureo-sericeis.

Long. 1½ lin.

Black, clothed above with golden pubescence, leaving on the thorax a complete mesial line, and a round spot on each side of the disk black. The elytra are clothed with golden pubescence, the margins and apex black, and an elongate-oval black spot cut out of the side of the golden pubescence and confluent with the black of the margin. The palpi and the anterior femora are obscure pitchy.

Hab.—Sydney (Salting).

Mordella humeralis, sp. n.

Nigra; capite thoraceque flavo-sericeis, hoc vittâ medianâ latâ maculâque magnâ utrinque nigris; elytris sub-purpurascentibus, vittâ humerali obliquâ flavo-piceâ, aureo-sericeâ, post medium guttis quatuor (2—2) transversim positis albidis.

Long. 1½ lin.

The dark markings on the thorax are not so well defined as in some of the preceding species. The elytra have on the shoulder an oblique slightly curved yellow stripe, extending from the humeral angle towards the suture to a little before the middle of the elytra, where it then turns upwards and joins the suture; this stripe is covered with golden pubescence. At some distance from the apex of each elytron there are two golden silky spots, one on the margin, the other between it and the suture, a little directed obliquely upwards. The under side and the posterior femora and tibiæ are more or less clothed with

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yellow pubescence; the abdomen has a spot on the side of the first and second segments, the margins of the third and fourth, and the entire fifth segment clothed with purple pubescence. The aculeus is rather short.

Hab.—Australia.

Mordella obliqua, sp. n.

Fusco-nigra, griseo-flavo-pubescens; elytris fusco-nigris, plagâ basali triangulari griseo-flavo-pubescenti.

Long. 2½ lin.

Rather an elongate, narrow species. Thorax convex and rather less broad than any of the above described. Elytra rather long, clothed with yellowish pubescence, with the sides pitchy-black. A line drawn from below the shoulder to the suture a little way from the apex would be the line of demarcation between the yellow pubescence and the dark margins. The abdomen is fuscous-black, with the usual silky spots on the sides of the first, second and third segments. The base of the antennæ and the anterior femora are slightly pitchy.

Hab.—S. Australia (Bakewell).

This species has somewhat the appearance of an *Anaspis*.

CERAMBYCIDÆ.

Zoëdia elegans, sp. n.?

Nigra, griseo-pubescens; thorace lateribus acute tuberculato; antennis, femorum basi, tibiis tarsisque rufis; elytris maculâ discoidali cuneiformi piceâ, lineâ albâ marginatâ et nigro-circumdatâ.

Long. 3¾ lin.

Whether or not I am justified in naming the specimen from which this diagnosis is taken must be a matter of opinion. It has been recently received from Tasmania, but I am uncertain whether or not it may be a variety of *Clytus v-album*, Boisd.

The type of *Z. triangularis* from Melbourne is now in the British Museum, I can, therefore, say for certain that it differs from that not only in having the head and thorax black, but in having the head more hollowed between the antennæ and without any distinct longitudinal channel, the sculpture is altogether a little finer, especially on the head and thorax, and the tubercle on the side of the

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thorax is more acute and the two small tubercles on the disk are more distinct. The spot on the disk of the elytra is pale ferruginous, not triangular; it is bordered above by a fine white line, which, commencing on the margin, approaches the suture slightly obliquely until it nearly reaches it, when it turns somewhat suddenly upwards and joins the suture some little way below the scutellum; the region around the spot is velvety black as in the other species. This spot on the elytra agrees more with the figure of *Z. divisa*, Pascoe (Journ. Ent. I. p. 362, t. xvii. f. 1), but I think that the Tasmanian example cannot be referred to that species, not only on account of the difference of coloration but the phrases "head canaliculate between the antennæ" and "prothorax swelling out at the middle into an *obtuse* knob" do not well accord with it.*

Lastly, there is the doubtful "*Clytus v-album*," Boisd. (Voy. d. l'Astr. p. 485, t. ix. f. 23), which appears (and I think correctly) as a *Zoëdia* in the Munich Catalogue. The figure of this insect is so very bad that it is impossible to say what it is, and, consequently, it might be intended for a colour variety of the Tasmanian specimen in question, and the description does not help one at all; for example, the femora are said to be fuscous with the base paler, and the first joint of the antennæ is "tout-à-fait de la couleur des cuisses;" "corselet petit, garni de petits tubercules pointus." The thorax having only the lateral tubercle and two very small ones on the disk in the *Zoëdia* known to me.

* Since the above was in print, Mr. Pascoe has kindly brought me his type specimen for comparison, and it proves to be distinct from *elegans*, in which the lateral tubercle of the thorax is distinctly more acute than in *divisa*, &c.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued*.

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Liparis monacha	•	...	...	Grey	...	...	...	•	Dorsal line darker. Two bluish tubercles on back of 2nd segment. Reddish tubercle on back of 9th, 10th and 11th segments.
Orgyia pudibunda	•	...	Yellowish-green	...	...	Reddish-yellow	...	...	Colour variable. Incisions between 5th to 8th segments deep black. 5th to 8th segments with a yellow tuft of hair; 12th with a red tuft.
„ fascelina	•	...	...	•	...	...	...	...	Hairs yellow. Black tufts on 5th to 8th segments, with white hairs on each side; long black tuft on 12th segment.
„ camosa	•	...	...	•	...	...	...	...	Hairs yellow. Two black tufts of hair from 2nd segment, and one tuft from last segment.
„ gonostigma	•	...	...	...	...	Orange	...	•	Four rows of black spots forming stripes. 5th to 8th segments with tufts of brown hairs; 2nd segment with two tufts of black hairs; 12th segment with one, and 13th with three black tufts.
„ antiqua	•	...	...	•	•	Pink	...	...	Parti-coloured, spotted with pink. 5th to 8th segments with tufts of yellow hairs; two tufts of black hairs on 2nd segment, and one on 12th.
Demas Coryli	•	...	...	Greyish	...	...	...	•	Broad black dorsal line. Tuft of brown hairs on 5th, 6th and 12th segments.
Trichiura Crataegi	•	...	...	Dark grey	...	...	...	...	Two red hairy tubercles on each segment. Row of pale spots along each side. A variety, annulated something like the larva of *Bombyx Rubi*, is known.
Pœcilocampa Populi	•	...	...	Grey	...	...	...	•	Marbled with black and ochreous. Whitish spots in a grey band on each segment. Orange subdorsal line. Long hairs on sides above legs. Probably protected by resemblance to lichen.

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brownish, one greyish-green and only one (*L. Sybilla*) green. Thus, while green is so preponderating a colour among smooth-skinned or ordinarily pubescent caterpillars (37 out of the 66 species of butterflies being of this colour), only a single spiny species is thus coloured.

Now, let us look at these numbers under a different aspect. Out of 66 species 10 are black; and, as we have already seen, all these are spiny or hairy. The larva of *Parnassius Apollo*—a species reputed to have been taken in this country—is stated to be black, and is not hairy or spiny; but, as it has red spots and blue tubercles, and the neck is furnished with a yellow forked appendage, it is probably sufficiently protected. The larva of *Papilio Machaon* is also marked with black and is provided with strongly-scented tentacles, which probably serve as a protection.

There are some other colours, which are instructive from the present point of view. Take brown, for example. There are 16 species of this colour, and of these, seven are hairy or spiny.

Red and blue are rare colours among caterpillars. Omitting minute dots, we have six species which are more or less marked with red or orange, viz., *A. Aglaia*, *V. Antiopa*, *N. Lucina*, *C. Alsus*, *P. Cratægi* and *P. Machaon*. Of these, two are spiny, two hairy, and one protected by scent-emitting tentacles. The orange medio-dorsal line of *C. Alsus* is not very conspicuous, and has been omitted in some descriptions. The larvæ of *Papilio Podalirius* and *Parnassius Apollo*—two species formerly reputed British—are also marked with red, and these are likewise provided with tentacles. Blue is even rarer than red; in fact, none of our butterfly larvæ can be said to exhibit this colour. The caterpillar of *P. Apollo* is figured as having blue tubercles.

Now, let us turn to the moths. Of these caterpillars I have tabulated the *Sphingidæ*, *Cocliopidæ*, *Procridæ*, *Zygænidæ*, *Nolidæ*, *Lithosidæ*, *Euchelidæ*, *Chelonidæ*, *Liparidæ*, *Bombycidæ*, *Drepanulæ* and *Pseudo-Bombyces* —these groups comprising nearly all our larger species. The *Hepialidæ*, *Zeuzeridæ* and *Sesidæ* have been omitted, because these larvæ are all internal or subterranean feeders, and are devoid of any striking colour.* This leaves

* See some remarks on this subject in a paper by Mr. Meldola, "On a certain Class of Cases of Variable Protective Colouring in Insects," in "Proc. Zool. Soc." for 1873, p. 159.

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122 species, out of which 68 are hairy or downy; and of these, 48 are marked with black or grey, 15 brown or brownish, two yellowish-green, one bluish-grey, one striped with yellow and black and one reddish-grey. Of the two yellowish-green hairy species, which might be regarded as exceptions, *Z. Lonicerœ* is marked with black and yellow, and *N. albulalis* is variable in colour, some specimens of the caterpillar being orange. This last species is also marked with black, so that neither of these species can be considered of the green colour, which serves as a protection. Thus, among the moths tabulated, there is not a single hairy species of the usual green colour. On the other hand, there are 50 species with black or blackish caterpillars, and of these, 48 are hairy or downy.

In eleven of our larger moths the caterpillars are more or less marked with red. Of these three are hairy, one is an internal feeder, four have reddish lines, which probably serve for protection by simulating lines of shadow,* and one (*D. Euphorbiæ*) is inedible. Of the remaining two, *Calocampa exoleta* (not included in the tables) has a red line on the side of the body. The last, *D. livornica*, is rare, and I have never seen the caterpillar, but, to judge from figures, the reddish line and spots would render it not more but less conspicuous amongst the low herbage which it frequents.

Seven species only of our larger moths have any blue; of these four are hairy, the other three are hawk-moths. In one (*A. Atropos*) the violet colour of the side stripes certainly renders the insect less conspicuous among the flowers of the potato, on which it feeds. In *C. Nerii* there are two blue patches, which, both in colour and form, curiously resemble the petals of the periwinkle, on which it feeds. In the third species, *C. Porcellus*, the bluish spots form the centres of the above-mentioned ocelli.

Among the *Geometridæ* the caterpillars are very often brown, and closely resemble bits of stick, the similarity being much increased by the peculiar attitudes they assume. The large brown caterpillars of certain *Sphingidæ* are night feeders, concealing themselves on the ground by day, and it is remarkable that white species, such as *S. Convolvuli*, which feed on low plants, turn brown as they increase in age and size; others, like the *Smerinthi*,

* The oblique stripes on the sides of the sphinx larvæ may serve a similar purpose.

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which frequent trees, and cannot therefore descend to the ground for concealment, remain green throughout life. Omitting these, we find in the table 23 brown species, of which 12 are hairy, and two have extensile caudal filaments. Three at least of the others, though not *Geometridæ*, closely resemble bits of stick, and place themselves in peculiar stiff attitudes. The others are small species.

It has been suggested to me by Mr. Meldola that in certain instances hairs may serve as a protection, instead of acting simply as signals of distastefulness. This appears to be the case with such species as *Pœcilocampa Populi*, which has a fringe of long hairs along the sides, just above the legs. In these cases the insects rest by day on lichen or bark, to which they assimilate in colour and marking, and in such situations would stand a chance of detection, in spite of their protective colouring, if they stood out in bold relief, and cast a sharp shadow. The hairs may thus have been acquired for the purpose of shading off the sharp outline of the caterpillars, an analogous function being probably fulfilled by the row of fleshy protuberances along the sides of *Lasiocampa quercifolia*, and species of *Catocala*.

Thus, summing up the caterpillars, both of the butterflies and moths, out of the 88 spiny and hairy species tabulated, only one is green (*L. Sybilla*), and even this may not be protectively coloured, since it has yellow warts and white lateral lines. On the other hand, a very great majority of the black and brown caterpillars, as well as those more or less marked with blue and red, are either hairy or spiny, or have some special protection. The general review, then, which I have here very imperfectly attempted, confirms, in a remarkable manner, the views of the eminent naturalists to whom I have referred.

Note.—In the following tables the general ground colour of the dorsal surface of the full-grown caterpillar is indicated in the respective columns by an asterisk. Special markings and their colours are described in the column headed "Remarks." Larvæ merely pubescent are not considered hairy.

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TABLE OF CATERPILLARS OF BRITISH BUTTERFLIES.†

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Maniola Epiphron (= *Cassiope*) ...	...	•	...	...	...	...	...	•	Pale green, striped with darker green. Spiracular line white.
„ Medea (= *Blandina*) ...	...	...	...	...	•	...	...	•	Medio-dorsal line blackish. Lateral lines paler.
Melanargia Galathea	...	•	...	...	•	...	...	•	Colour variable, greenish or brown. Medio-dorsal line dark, bordered by pale area, intersected by a reddish sinuous line. Lateral area pale ferruginous. Spiracular line whitish.
Satyrus Ægeria	...	•	...	...	•	...	...	•	Colour variable, dull green or brown. Medio-dorsal line dark. Marginal lines whitish.
„ Megæra	...	•	...	...	...	...	...	•	Medio-dorsal line darker. Lateral stripes paler.
Epinephele Jurtina (= *Janira*) ...	...	•	...	...	...	...	...	•	Medio-dorsal line darker. Lateral lines whitish.
„ Tithonus	...	•	...	...	•	...	...	•	Colour variable, greenish or brown. Medio-dorsal line darker. Lateral stripes whitish.
Hipparchia Hyperanthus	...	...	...	...	•	...	...	•	Medio-dorsal line darker. Lateral lines paler.
„ Semele...	...	...	...	...	Drab	...	...	•	Medio-dorsal and other lines darker.
Cœnonympha Pamphilus... ...	...	•	...	...	...	...	...	•	Medio-dorsal and other lines darker, bordered with whitish.
„ Typhon (= *Davus*)	...	•	...	...	...	...	...	•	Medio-dorsal line dark, bordered with yellow. Lateral lines yellow.
Argynnis Paphia	Spiny	...	...	•	...	...	...	•	Two yellow dorsal lines. Spines rust-coloured.
„ Aglaia	Spiny	...	...	...	•	...	...	•	Body marbled with black. Dorsal line black, bordered with yellow. Row of red blotches along side. Spines black.
„ Adippe	Spiny	...	...	...	•	...	...	•	Medio-dorsal line white, passing through a row of black markings. Spines whitish.
„ Niobe	Spiny	...	...	...	•	...	...	•	Spines and medio-dorsal line white. (?)
„ Lathonia	Spiny	...	...	...	•	...	...	•	Medio-dorsal and lateral lines whitish.

† The order and nomenclature followed is that of Kirby's "Synonymic Catalogue of Diurnal Lepidoptera." The descriptions of larvæ are mostly from Newman's "British Butterflies."

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TABLE OF CATERPILLARS OF BRITISH BUTTERFLIES—*continued*.

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Argynnis Euphrosyne	Spiny	...	...	*	...	...	...	*	Lateral stripes pale. Body sprinkled with white dots. Dorsal spines yellow at base, black at tip.
,, Selene	Spiny	...	...	...	*	...	...	...	Spines pale at base, black at tip.
Melitæa Aurinia (= *Artemis*) ...	Spiny	...	...	*	...	...	...	...	Medio-dorsal and lateral lines, composed of white dots.
,, Cinxia	Spiny	...	...	*	...	...	...	...	Belts of white dots between segments.
,, Athalia	Spiny	...	...	*	...	...	...	...	Body dotted with white.
Vanessa C-album	Spiny	...	...	Grey	...	...	...	*	Body with brown markings. Medio-dorsal line white.
,, Antiopa	Spiny	...	...	*	...	...	...	...	Row of dorsal blotches dull red.
,, Io	Spiny	...	...	*	...	...	...	...	Body dotted with white.
,, Urticæ	Spiny	...	...	*	...	...	...	*	Body dotted with yellow. Lateral lines yellowish.
,, Polychloros	Spiny	...	...	...	Tawny	...	...	*	Medio-dorsal line black. Body covered with pale warts.
Pyrameis Atalanta	Spiny	...	...	Grey-green or black	...	...	...	*	Colour variable. Lateral stripes white or yellow. Colour of spines variable.
,, Cardui	Spiny	...	...	*	...	...	...	*	Medio-dorsal line occasionally black, bordered by rows of whitish dots.
Limenitis Sybilla	Spiny	*	...	...	...	...	...	*	Dark green, with yellow warts. Lateral lines white.
Apatura Iris	...	*	...	...	...	...	...	*	Head with two greenish horns. Sides of body with oblique yellow stripes. Lateral lines yellow.
Nemeobius Lucina	*	...	...	...	Brownish-grey	...	...	*	Medio-dorsal and lateral lines smoky olive. Body with yellow dots and orange hairy warts.
Lycæna Hippothoë...	...	*	...	...	...	...	...	...	Colour obviously protective.
,, Phlæas	...	*	...	...	...	...	...	*	Body dotted with white warts. Medio-dorsal and lateral lines pink when present.
Cupido Bœticus	...	*	...	...	*	...	...	*	Colour variable, olive or bright green or reddish-brown. Medio-dorsal line dark. Lateral lines white. Oblique stripes along sides of body.
,, Argus (= *Egon*)	...	*	...	...	...	...	...	*	Medio-dorsal line brown, edged with white. Lateral lines whitish. Sides of body with paler oblique stripes.

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TABLE OF CATERPILLARS OF BRITISH BUTTERFLIES—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Cupido Alexis (=*Agestis*) ...	...	•	...	...	...	...	...	•	Medio-dorsal line brownish-purple. Sides of body with oblique faint lines. A double row of bristly warts.
,, Icarus (=*Alexis*)	...	•	...	...	...	...	...	•	Medio-dorsal line darker. Lateral stripes whitish. Faint oblique lines on sides. Body covered with minute black warts, each emitting a hair.
,, Thetis (=*Adonis*) ...	...	•	...	...	...	...	...	•	Dorsal series of fulvous spots. Lateral lines yellow.
,, Corydon	...	•	...	...	...	...	...	...	Body sprinkled over with black dots, each emitting a short bristle. Six longitudinal series of yellow spots. Dorsal series on warts.
,, Argiolus	...	•	...	...	...	...	...	•	Dorsal line green.
,, Alsus	...	•	...	...	...	...	...	•	Medio-dorsal line orange-red. Sides of body with oblique yellowish lines. Pale side stripes.
,, Semiargus (=*Acis*) ...	...	...	...	...	...	...	...	...	Larva unknown. (?)
,, Arion	...	...	...	...	...	Dirty pink	...	•	Medio-dorsal line rust-coloured.
Thecla Prunî	...	•	...	...	...	...	...	•	Dorsal and lateral lines yellow.
,, W-album	...	•	...	...	...	...	...	•	Dorsal furrow brown, edged with yellow. Sides of body with pale oblique stripes, covered with delicate hairs.
,, Rubi...	...	•	...	...	...	...	...	•	Medio-dorsal, lateral and oblique side lines yellowish.
Zephyrus Quercus	...	...	...	...	•	...	...	•	Body covered with fine scattered hairs.
,, Betulæ	...	•	...	...	...	...	...	•	Longitudinal and oblique lines whitish. Body slightly hairy.
Leucophasia Sinapis	...	•	...	...	...	...	...	•	Medio-dorsal line dark green, edged with yellowish-green. Spiracular line yellow. Body partially dotted with black.
Pieris Daplidice	...	...	...	...	...	...	Bluish-grey	•	Longitudinal lines yellow. Body with scattered black warts, each emitting a slender hair.

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TABLE OF CATERPILLARS OF BRITISH BUTTERFLIES—*continued*.

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Pieris Napi	...	•	...	...	...	...	...	...	Body covered with black warts, each emitting a slender hair.
„ Rapæ	...	•	...	...	...	...	...	•	Longitudinal lines and series of spots yellow. Body with black and white warts, each emitting a very minute hair.
„ Brassicæ	...	...	...	...	...	...	Bluish-grey	•	Body covered with black warts, each emitting a slender hair. Medio-dorsal and lateral lines yellow.
„ Cratægi	•	...	...	•	...	...	...	•	Two dorsal rust-coloured stripes composed of dots. Hairs of head black and white, of dorsal warts rust-coloured.
Gonepteryx Rhamni	...	•	...	...	...	...	...	•	Body covered with extremely minute black warts, each of which emits a short white bristle. Pale slender lateral wavy lines.
Colias Croceus (= *Edusa*)... ...	...	•	...	...	...	...	...	•	Body covered with minute black warts, surrounded by a whitish ring, each wart emitting a short hair. Pale lateral stripes.
„ Hyale	...	•	...	...	...	...	...	•	Body sprinkled with black dots. Spiracular line white interrupted with yellow.
Euchloë Cardamines	...	•	...	...	...	...	...	•	Body covered with minute black warts, each emitting a short bristle. Lateral stripe white.
Papilio Machaon	...	•	...	...	...	...	...	...	Scent-emitting tentacles protrusible from transverse dorsal slit of 2nd segment. Black rings between segments, alternated with transverse black bars, interrupted by bright orange spots.
Pamphila Comma	...	•	...	...	...	...	...	...	Linear white spot on each side of 10th and 11th segments very near ventral surface.

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TABLE OF CATERPILLARS OF BRITISH BUTTERFLIES—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Pamphila Sylvanus	...	•	...	...	...	...	...	•	Dark dorsal line dotted with black. White transverse spots beneath on 10th and 11th segments.
Thymelicus Thaumas (=*Linea*)...	...	•	...	...	...	...	...	•	Body with six slender white stripes.
„ Actæon	...	•	...	...	...	...	...	•	Night feeder. Dorsal line dark, edged with yellowish and enclosing a paler line. Double yellow line along side. Two white spots as in *P. Sylvanus*.
Hesperia Malvæ	...	•	...	...	•	...	...	•	Colour variable, brown or green. Dorsal line darker. Lateral line triple. Central portion dark, lateral portions white.
Heteropterus Palæmon (=*Paniscus*)	...	...	...	...	•	...	...	•	Two yellow stripes down the back.
Nisoniades Tages	...	•	...	...	...	...	...	•	Two yellow lines along the sides, each surmounted by black spots.

TABLE OF CATERPILLARS OF BRITISH MOTHS.†

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Smerinthus ocellatus	...	•	...	...	...	...	...	•	Body dotted with white. Oblique white lateral stripes. Horn blue.
„ Populi...	...	•	...	...	...	...	...	•	Body dotted with yellow. Oblique yellow lateral lines. Horn yellowish above, reddish beneath.

† The order and nomenclature followed is that of Newman's "British Moths," from which work the descriptions are also mostly taken.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued*.

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Smerinthus Tiliæ	...	*	...	....	....	....	....	*	Body dotted with yellow. Oblique yellow lateral lines sometimes margined with red. Horn blue above, yellow beneath; behind it a violet plate edged with yellow.
Acherontia Atropos	...	*	*	....	*	....	....	*	Body towards head and lower part of sides green. Oblique lateral lines violet. A brown variety known.
Sphinx Convolvuli...	...	*	....	....	*	....	....	*	Oblique lateral stripes black, bordered with white. Horn yellowish. A brown variety known.
„ Ligustri	....	*	....	....	....	....	....	*	Oblique lateral stripes white, bordered above with lilac. Horn black, under side of lower half yellow.
„ Pinastri	....	*	....	....	....	....	....	*	Dorsal stripe red-brown. Lateral lines yellow. Horn black. Resembles food plant.
Deilephila Euphorbiæ	...	....	....	*	....	*	....	*	Body with whitish dots and red spots. Dorsal line and head red. Horn red, tipped with black.
„ Galii	...	*	....	*	*	....	....	*	Colour variable, bluish-green, brown or black. Dorsal line yellowish, a row of yellow spots on each side. Horn red.
„ livornica	...	....	Yellowish-grey	....	*	....	....	*	Broad dorsal line and under side black. Body with crescent-shaped black markings on each side, and double row of orange spots. Horn red, with black tip.
Chærocampa Celerio	...	*	....	....	*	....	....	....	Colour variable, green or purplish-brown. Two black spots, dotted with yellow, and encircled by a yellow ring on 5th and 6th segments. Horn brown.
„ Porcellus	...	*	....	....	*	....	....	....	Colour variable, brown or green. Body mottled with dark brown, dark green or black. Ocellated bluish spot on 5th and 6th segments.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Chærocampa Elpenor	...	*	...	...	*	...	...	...	Colour variable, brown or green. Large ocellated spots on 5th and 6th segments. Horn black, with white tip.
„ Nerii... *	...	*	...	...	*	Orange	...	*	Colour variable, brown, green or orange. Body dotted with white. Blue spot on 3rd segment. Lateral band whitish. Horn orange-yellow.
Macroglossa stellatarum	...	*	...	...	*	...	...	*	Colour variable, green or pinkish-brown. Lateral lines whitish. Horn dull blue, tip yellowish.
„ fuciformis	...	*	...	...	*	...	...	*	Colour variable, bluish-green or brown. Body covered with minute whitish warts. Dorsal line yellowish. Lateral lines white and pink. Horn brown-red or orange.
„ bombyliformis† ...	...	*	...	...	?	...	...	...	Body dotted with yellowish-white. On each side of 5th to 12th segments two rows of reddish spots. Horn reddish.
Limacodes Alsellus	...	Yellow-green	...	...	...	...	...	*	Yellow dorsal line. Body with shining pinkish dots.
Testudo	...	*	...	...	...	...	...	*	Two whitish lines down back. Lateral line yellow. Body with shining pinkish pimples.
Procris Statices	Downy	...	Yellowish	*	...	...	...	*	Body covered with warts and black papillæ. Medio-dorsal line whitish, bordered with reddish-purple. Lateral line yellowish above, reddish-purple beneath.
„ Geryon	Downy	...	Yellowish	*	...	...	...	...	Body covered with minute black dots. Medio-dorsal line whitish, bordered with purple. Broad dingy yellow stripe on each side.

† The *Sesiæ*, *Zeuseridæ*, and *Hepialidæ*, which should here be inserted, according to the arrangement followed by Newman, have been omitted because the larvæ are all internal or subterranean feeders. The *Sesiæ* (*Ægeriidæ*) have been recently shown by Mr. A. G. Butler (Trans. Ent. Soc. 1878, p. 121) to be closely allied, on the one hand, to the *Pyrales*, and on the other to the *Gelechiidæ*.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Procris Globulariæ	Downy	...	...	Blackish	...	...	...	*	Row of triangular green spots on back. Lateral line blue, with included row of yellow dots.
Zygæna Minos	...	*	*	...	...	...	...	...	Colour variable, green or yellow. Two rows of black spots on each side.
„ exulans	*	...	...	...	Dingy-ochreous	...	...	...	Hairs black. Lateral row of pale spots.
„ Trifolii	...	*	...	...	...	...	...	...	Two dorsal rows of black spots, and a row of black spots on each side.
„ Meliloti	...	*	...	...	...	...	...	*	Differs but little from preceding species (Briggs).
„ Loniceræ	*	...	Yellowish-green	...	...	...	...	*	Speckled with black. Two black stripes on each side. Lateral row of yellow spots between black lines.
„ Filipendulæ	Slightly	...	*	...	...	...	...	...	Two rows of black spots on each segment.
Naclia Ancilla	*	...	...	*	...	...	...	*	Body with hairy warts; hairs black. Medio-dorsal and other stripes yellow.
Nola cucullatella	*	...	...	...	*	...	...	...	Row of paler spots down back.
„ confusalis (= *cristulalis*) ...	*	...	Dull yellow	...	...	...	...	*	Fine blackish lines along body.
„ Strigula	*	...	Dull yellow	...	...	...	...	*	Dorsal stripe broad, yellowish or whitish flesh-coloured. Subdorsal stripe brownish-grey. Hairs brown and yellowish. Black spot on 7th segment.
„ Centonalis	...	...	...	...	...	...	...	...	Caterpillar unknown. (?)
„ albulalis	*	...	Yellowish green	...	...	Orange	...	...	Colour variable. Two rows of black marks on dorsal surface. Hairs whitish, springing from six tubercles on each segment (Barrett).
Nudaria Senex	*	...	...	Smoky	...	...	...	...	Six tubercles on each segment emitting tufts of hairs so dense as to conceal skin. Hairs smoky and brown (Buckler and Hellins).
„ mundana	*	...	*	...	Greyish-brown	...	...	*	Dorsal line greyish-brown, subdorsal yellow. Sides and hairs greyish-brown (Buckler and Hellins).

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Setina irrorella	*	...	...	*	...	...	...	*	Dorsal line yellow.
Calligenia miniata	*	...	...	...	*	...	...	...	Hairs blackish.
Lithosia mesomella	*	...	...	Greyish	...	...	...	*	Blackish stripe on each side of back. Hairs very dense and blackish.
„ muscerda	*	...	...	...	*	...	...	*	Dorsal and subdorsal lines black. Red spots on 2nd and 13th segments. Hairs brown (Buckler and Hellins).
„ unita (= *aureola*) ...	*	...	...	Grey	...	...	...	*	Medio-dorsal line double, composed of orange spots.
„ pygmæola	*	...	...	*	*	...	...	*	Thick black dorsal line. Spiracular line whitish hairs brown (Buckler).
„ deplana (= *helvola*) ...	*	...	...	Grey	...	...	...	*	Colour variable, grey or white. Sides grey, brownish-grey or greenish-grey. Subdorsal stripe black. Hairs grey (Hellins).
„ caniola	*	...	...	*	...	...	...	*	Medio-dorsal line black, bordered with grey. Lateral lines orange.
„ lurideola (= *complanula*)	*	...	...	Blackish	...	...	...	*	Lateral line reddish.
„ molybdeola	*	...	...	Grey	...	...	...	*	Dorsal stripe black. Subdorsal row of parti-coloured spots, then a black stripe. Greyish ochreous line above legs (Hellins).
„ complana	*	...	...	...	*	...	...	*	Yellow, red and white spotted stripe on each side of back; orange line above the feet.
„ griseola	*	...	...	Blackish	*	...	...	*	Subdorsal orange ochreous stripe. Orange patch on 3rd segment. Hairs dark brown (Hellins.)
„ straminiola	*	...	...	...	...	Orange	...	...	Back of 2nd, 3rd and anal segments orange. Subdorsal series of red markings. Dorsal line and hairs brown (Guenée and Buckler).
„ quadra	*	...	...	Grey	...	...	...	*	Yellow and black stripes, bordered with red warts.
„ rubricollis	*	...	...	Grey	...	...	...	*	Black stripes, in which are red and white spots.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Eulepia grammica	*	...	...	*	...	...	...	*	Dorsal line yellow; lateral lines white. Reddish hairy warts.
„ Cribrum	*	...	...	*	...	...	...	*	Dorsal and lateral lines white.
Delopeia pulchella	*	...	...	...	...	...	Bluish-grey	*	Dorsal stripe white; hairs black; row of double scarlet spots down side
Euchelia Jacobeæ	*	...	...	*	...	Orange	...	...	Slightly hairy; orange annulated with black.
Callimorpha Dominula	*	...	...	*	...	...	...	*	Hairs black, springing from bluish warts. Dorsal and lateral lines yellow.
Euthemonia russula	*	...	...	...	*	...	...	*	Yellow dorsal line. Hairs reddish-brown.
Chelonia Plantaginis	*	...	...	Dark grey	...	...	...	...	Hairs at both ends black; red-brown on middle segments.
„ Caja	*	...	...	*	...	...	...	...	Hairs on back grey; on side and about head reddish-brown.
„ villica	*	...	...	*	...	...	...	...	Hairs brown.
Arctia fuliginosa	*	...	...	...	*	...	...	...	Hairs brown.
„ mendica	*	...	...	Grey	*	...	...	*	Colour variable, grey or smoky-brown. Dorsal line paler. Hairs rust-coloured.
„ lubricipeda	*	...	...	Greyish	...	...	...	*	Dorsal line pale; lateral stripes broad and grey. Pale grey oblique stripes along sides.
„ Menthastri	*	...	...	...	*	...	...	*	Dorsal line orange. Hairs brown.
„ Urticæ	*	...	...	Blackish	...	...	...	*	Indistinct dorsal line.
Liparis chrysorrhœa	*	...	...	*	...	*	...	*	Tubercles and humps. Hairs white and reddish. White stripe on each side of back. Scarlet markings.
„ auriflua	*	...	...	*	...	*	...	*	Tubercles and humps. Red projection behind head, and two red lines along back. Row of white hairy tubercles along side.
„ Salicis	*	...	...	Greyish	...	...	...	*	Row of conspicuous white spots down back, with black stripe containing red warts on each side.
„ dispar	*	...	...	*	...	...	...	*	Netted with grey. Dorsal line grey. Red and grey tubercles on body. Hairs on back black, on sides brown.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Liparis monacha	*	...	...	Grey	...	...	...	*	Dorsal line darker. Two bluish tubercles on back of 2nd segment. Reddish tubercle on back of 9th, 10th and 11th segments.
Orgyia pudibunda	*	...	Yellowish-green	...	...	Reddish-yellow	...	...	Colour variable. Incisions between 5th to 8th segments deep black. 5th to 8th segments with a yellow tuft of hair; 12th with a red tuft.
„ fascelina	*	...	...	*	...	...	...	...	Hairs yellow. Black tufts on 5th to 8th segments, with white hairs on each side; long black tuft on 12th segment.
„ cænosa	*	...	...	*	...	...	...	...	Hairs yellow. Two black tufts of hair from 2nd segment, and one tuft from last segment.
„ gonostigma	*	...	...	...	...	Orange	...	*	Four rows of black spots forming stripes. 5th to 8th segments with tufts of brown hairs; 2nd segment with two tufts of black hairs; 12th segment with one, and 13th with three black tufts.
„ antiqua	*	...	...	*	*	Pink	...	...	Parti-coloured, spotted with pink. 5th to 8th segments with tufts of yellow hairs; two tufts of black hairs on 2nd segment, and one on 12th.
Demas Coryli	*	...	...	Greyish	...	...	...	*	Broad black dorsal line. Tuft of brown hairs on 5th, 6th and 12th segments.
Trichiura Crataegi	*	...	...	Dark grey	...	...	...	...	Two red hairy tubercles on each segment. Row of pale spots along each side. A variety, annulated something like the larva of *Bombyx Rubi*, is known.
Poecilocampa Populi	*	...	...	Grey	...	...	...	*	Marbled with black and ochreous. Whitish spots in a grey band on each segment. Orange subdorsal line. Long hairs on sides above legs. Probably protected by resemblance to lichen.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Eriogaster lanestris	*	...	...	*	...	...	...	*	Slightly hairy. Three white spots and two red warts on each segment. Pale grey stripe along each side.
Bombyx neustria	*	...	...	*	...	Orange	*	*	Many coloured stripes, white, black, blue and orange. Dorsal line white. Slightly hairy, hairs dark brown above, golden brown towards legs. Head and 2nd segment blue.
„ castrensis	*	...	...	*	...	Orange	...	*	Many coloured stripes, grey, orange-brown and black. Dorsal line whitish. Hairs golden brown.
„ Rubi	*	...	...	*	Orange-brown	...	...	...	Sides and spaces between segments black.
„ Quercus	*	...	...	*	...	...	...	*	Hairs amber coloured, short and dense. Interrupted white lateral line. Red centred white spot on 3rd and 4th segments above lateral line.
„ Trifolii	*	...	...	*	...	...	...	*	Hairs bright orange on back, grey on sides. Grey stripe on each side.
Odonestis potatoria	*	...	...	...	...	...	Blue-grey	...	Body dotted with black. Orange spots and oblique streaks on each side, alternated with tufts of white hair.
Lasiocampa quercifolia	*	...	...	Grey	*	...	...	*	Colour variable. Incisions between 2nd and 4th segments purple. Lateral stripe whitish. Hump on 12th segment. Slightly hairy. Row of fleshy protuberances along each side above legs.
„ ilicifolia	*	...	...	Grey	...	...	...	*	Hairs reddish. Dorsal line black. Reddish spot on each segment. Lateral stripe bluish below, white above.
Endromis versicolor	...	*	...	...	...	...	...	*	Sides dotted with black. Back paler than sides. Medio-dorsal line darker. An obliqued white line on each side of each segment. Hump on 12th segment, ending in a short white horn.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Saturnia carpini †	...	*	...	...	...	...	...	...	Black-ringed pink tubercles on each segment. Tuft of short black bristles emitted by each tubercle. Probably protected by resemblance to food-plant, heath.
Platypteryx lacertula	...	...	Yellowish-brown	*	*	...	...	*	Tubercles on 3rd to 6th segments. Medio-dorsal series of black streaks and two oblique black streaks on each side of each segment. Lateral line white, intersected with pink.
„ sicula...	...	...	*	...	*	...	...	*	Two tubercles on 4th segment, brown with yellow tips. Dorsal region brownish-ochreous, blotched with dark crimson-brown on thoracic segments, yellow on the remainder. Lateral region pink, freckled with dark crimson-brown (Buckler).
„ falcula	...	*	...	...	*	...	...	*	Tubercles on 3rd to 6th segments, each emitting short bristles. Minute warts on 7th to 11th segments. Broad red-brown stripe down middle of back.
„ hamula	...	...	...	...	Greyish-brown	...	...	*	Broad dorsal stripe, partly greenish-brown and partly yellowish-brown; edged with yellow. Tubercles on 4th segment.
„ unguicula	...	...	...	...	*	...	...	*	Two tubercles on 4th segment; body covered with warts, each emitting a minute hair. Narrow white line on each side; white V-shaped mark on back of 6th segment. Pale spot on each side of 11th segment.
Cilix spinula	...	...	...	...	*	...	...	*	Medio-dorsal line darker. Pale lateral line on each side of 12th segment. Tubercles on 3rd and 4th segments.

† The *Geometræ* and *Noctuæ* are omitted from here.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued*.

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Dicranura bicuspis...	...	Yellowish-green	...	...	...	...	...	*	Distinct stripe on each side, lower part white, upper part pink. Oblique white streaks on each segment. Caudal horns black, tipped with red.
„ furcula	...	Green and white	...	...	...	...	...	*	Lateral stripe white, margined with purple. Dorsal area white, with median green line. Oblique green stripes on 7th to 11th segments. Lateral surface green, blotched with purple and orange. Caudal horns white.
„ bifida	...	*	...	...	*	...	...	*	Dorsal area brownish, with darker and lighter marblings, and bordered with yellow. Lateral area green, dotted with brown. Anal tubes green, containing protrusible filaments.
„ vinula	...	*	...	...	*	...	...	*	Dorsal area whitish, striated with purplish-brown. Lateral stripe white. Lateral area green. Caudal tubes whitish, with pink protrusible filaments.
Stauropus Fagi	...	...	...	...	*	...	...	*	Medio-dorsal line paler, margined with black. Slender black markings on sides. Body covered with pale points. Two humps on each segment from 5th to 10th. Caudal appendages.
Petasia cassinea	...	*	...	...	...	...	...	*	Colour variable. Longitudinal whitish lines.
„ nubeculosa	...	*	...	...	...	...	...	*	Oblique yellow stripe on each side of 4th segment. Whitish clouds on back and sides. Yellow line on elevation on 12th segment. Yellow and white dots on sides.
Pygæra bucephala	*	...	*	*	...	...	...	*	Broad dorsal and three lateral lines black. Hairs long and soft.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Clostera curtula	*	...	...	...	...	Reddish-grey	...	...	Black dorsal humps on 5th and 12th segments. Orange warts on sides. Hairs white. Body dotted with black.
„ anachoreta	*	...	...	*	...	...	...	*	Brown humps on 5th and 12th segments. Body mottled with grey. Medio-dorsal line whitish. White spots surrounded by black on 5th segment. Black markings on each side of dorsal line. Hairs brown.
„ reclusa	*	...	...	Grey	...	...	...	*	Black humps on 5th and 12th segments. Broad grey dorsal line, containing yellow markings. Slightly hairy. Lateral rows of black and yellow spots.
Gluphisia crenata	...	*	...	...	...	...	...	*	Dorsal line spotted with red-brown, and bordered with yellow.
Ptilophora plumigera	...	*	...	...	...	...	*	*	Broad dorsal line bluish, with white line on each side. Two wavy lateral yellow lines.
Ptilodontis palpina,..	...	*	...	...	...	...	...	*	Double row of minute white warts down back. White lateral stripe, with a yellow-black margined line below.
Notodonta camelina	...	*	...	...	...	...	...	*	Two pink-tipped tubercles on 12th segment, with short black bristles. Slender bluish dorsal stripe. Spiracular stripe composed of dots, pink and white, and white lines. Scattered black bristles on body.
„ cucullina	...	...	...	Greyish	...	...	...	*	Dorsal line brown. Hump on 12th segment. Row of spiracular black dots.
„ carmelita	...	*	...	...	...	...	...	*	Raised yellow markings on back. Parti-coloured lateral stripe white, yellow and pink.
„ bicolor	...	*	...	...	...	...	...	*	Four slightly darker stripes on dorsal surface. Lateral lines bright yellow.

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TABLE OF CATERPILLARS OF BRITISH MOTHS—*continued.*

Name of Species.	Hairy.	Green.	Yellow.	Black.	Brown.	Red.	Blue.	Striped.	Remarks.
Notodonta dictæa	...	*	...	...	*	...	...	*	Colour variable, green or brown. Paler green stripe on each side. Yellow-green stripe below spiracles. Hump on 12th segment.
„ dictæoides	...	...	...	...	*	...	...	*	Lateral yellow stripes. Hump on 12th segment.
„ dromedarius	...	*	...	...	...	...	...	*	Green, with purplish-brown markings, forming a stripe down back. Humps on 5th to 9th segments.
„ trilophus	...	*	...	...	...	...	...	...	5th, 6th, 7th and 12th segments with humps.
„ ziczac	...	...	...	...	*	...	...	*	Humped on 6th, 7th and 12th segments. Darker and paler markings on back and sides. Paler oblique lines on sides.
„ trepida	...	*	...	...	...	...	...	*	Two yellowish-white dorsal lines. Lateral brown blotches on 2nd and 3rd segments. Seven oblique stripes along sides, pink in upper and whitish in lower portion.
„ chaonia...	...	*	...	...	...	...	...	*	Lateral and dorsal lines yellow.
„ dodonea	...	*	...	...	...	...	...	*	Double yellow dorsal line. Lateral stripe alternately pink and pale yellow.
Diloba cæruleocephala	...	*	*	...	...	...	...	*	Broad yellow dorsal stripe. Sides bluish-green. Yellow stripes below spiracles. Numerous black warts all over the body.

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XXIII. *Entomological Notes.* By Prof. JAMES WOOD-MASON.

1. *On the difference in the form of the Antennæ between the Males of* Idolomorpha *and those of other genera of* Empusidæ, *a subfamily of* Mantidæ. [Read August 7th, 1878.]

ANTENNÆ are by Burmeister said to be *pectinated* when the joints have long processes on one side, like the teeth of a comb, and to be *bipectinated* when such a process issues from each side of the joint.

"*Antennæ bipectinatæ*" have been ascribed to the males of all the *Empusidæ* by every entomologist who has written about them.

Burmeister,* in 1839, proposed the family name *Empusidæ* for those species of *Mantodea* in which "the head is prolonged into a conically-ascending process, and in which the males have the antennæ bipectinated (*doppelt gekämmt*); he recognized two leading and co-ordinate genera, *Blepharis* and *Empusa*, to the former of which he referred only the widely-distributed and well-known *B. mendica*,† while the latter, divided according to the absence or presence and the degree of development of the foliaceous lobes on the legs and different parts of the body, into the three subgenera or sections, *Gongylus*, *Empusa*, and *Idolomorpha*, is made to receive all the rest. The *Gongyli* are accordingly *Empusæ*, in which the four posterior femora have three foliaceous lobes at the apex, and the pronotum is also expanded leaflike; the *Empusæ* have a single lobe at the apex of each of the femora; the *Idolomorphæ* being distinguished from them by being

* Handb. der Entomol. Band. ii. S. 544 *et seq.*

† It extends from the Canaries throughout N. Africa, Syria, and Arabia to the banks of the Indus.

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devoid of all traces of such lobes. Of the species discriminated by Burmeister, all have the antennæ truly bipectinated in the males but three—*Empusa capensis* (an *Idolomorpha* with lobed legs), which is described from females only, and the two species of *Idolomorpha*, of which neither the sex, nor any particulars that will enable one to guess at this, are given in the descriptions.

By Serville* the antennæ of the males of *Empusa* (in which are also included species placed by modern writers in *Gongylus* and *Idolomorpha*) and of *Blepharis*, the only two genera admitted by him, are described as "ayant leur six ou sept (*Empusa*) dix (*Blepharis*) premiers articles simple; les autres pectinés de deux côtes; chaque rameau étroit linéaire, termine en pointe obtuse (*Empusa*), élargi, arrondi au bout (*Blepharis*)." Of Serville's species, *E. purpureipennis* (=*E. capensis*, B.) and *E. defoliata* belong both, without a doubt, to *Idolomorpha;* but both having been founded on female specimens, the author could, of course, have had no opportunity of observing the structure of the antennæ in the males.

M. de Saussure† recognizes five genera in this group, viz., *Blepharis*, *Idolum*,‡ *Gongylus*, *Empusa*, and *Idolomorpha*, to the males of everyone of which he attributes bipectinated antennæ. He, like Burmeister, failed to discover any characters distinguishing *Empusa* and *Idolomorpha*, and adopted Burmeister's original definition of the latter, which, as Stål has recently shown, does not embrace all the species naturally belonging to it, some, such as *I. Wahlbergi* (and, I may add, *I. capensis*), having the four posterior femora, and even the abdomen more or less lobed, as in *Empusa*, and yet differing from the species of that genus, and at the same time agreeing with Burmeister's *Idolomorphæ* in the structure of the head, in the form of the genual lobes of the four posterior legs, and, I may add, in the unipectinate character of the antennæ in the males. We accordingly find him describing in the same work the two sexes of *I. capensis* as *Empusa*

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* Hist. Nat. des Orthopt. 1839, pp. 140—148.

† Mélanges Orthopt., i., 3me fasc. p. 327.

‡ The male of *Idolum diabolicum* (*Blepharis domina*, H. Woodward, Q. J. G. S. 1876, vol. xxxii, pl. ix, fig. 3, ♂) was unknown to de Saussure, but a fine specimen from the White Nile in the National Collection enables me to state that the teeth of the antennal pectinations are similar in form to those of *Blepharis mendica*, its near ally.

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*capensis** (correctly identifying with it Serville's *E. purpureipennis*, to which *I. Wahlbergi* may eventually also have to be added as a synonym), and a male insect with lobeless legs as *Idolomorpha defoliata*, Serville; but failing, in both cases, to notice anything remarkable about the antennæ of the male.

M. C. Stål, in his recently-published "Systema Mantodeorum," gives as a leading character of the subfamily, "antennæ marium bipectinatæ," and, from the fact that in the dichotomous table of genera he distinguishes between the "dentes pectinis elongati, angusti, compressi," of *Gongylus* (?), *Empusa*, and *Idolomorpha*, and the "dentes breviores, lati, subrotundati, basi coarctati" of *Blepharis*, may be presumed to have examined the antennæ with some care; but from his failure to remark so striking and important a character as the unipectinate condition of the male antennæ in *Idolomorpha*, a genus which, be it remembered, he was the first to establish on a firm basis, by detecting and pointing out the characters which really distinguish it from the closely similar *Empusæ*, we can only conclude, either that this acute entomologist satisfied himself with a careful examination of the male antennæ of *Blepharis* and of some species of *Empusa* (of *Gongylus*, ♂, he had none), or that he took his description of the differences between the two kinds of teeth on trust from Serville, who uses much the same words in describing them.

There can be no doubt, then, that the antennæ of the males in all the *Empusidæ* have been hitherto universally regarded by the best and most careful entomologists as bipectinate organs, bipectinated in the sense that each joint bears two distinct processes, and they have this structure in all the species belonging to the genera *Blepharis*, *Idolum*, *Gongylus*, and *Empusa*; but in *Idolomorpha*, though apparently doubly-combed, they are in reality unipectinate, having, that is to say, only one process to each joint. All those entomologists, therefore, who have taken the antennæ of male *Idolomorphæ* to be bipectinated must have been the victims of a sort of optical delusion, of

* M. de Saussure says of this species, "l'extrémité des ailes et souvent des élytres passe au *rose*." At the April Meeting of the Society I exhibited some coloured drawings made by J. P. Mansel Weale, B.A., from the living insect, in which these parts are represented as bright rose-red, especially on the under surface.

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the possibility of which anyone may easily convince himself who will glance at the antennæ of *I. capensis*, ♂, first, from above, shifting his gaze from side to side, so as to get a sight of the outer edges of the teeth, when the organs will appear to be bipectinated, but to have the two apparent rows of pectinations subparallel with one another instead of widely divergent at their free ends as in the truly bipectinated group; and then directly from the side, when they will appear to have but one row of teeth. The teeth are in fact alternately straight (*a*) and curved at the base (*b*), the latter forming the apparent inner, and the former the outer, row of teeth.

The accompanying diagrams, drawn by the aid of the camera lucida, exhibit the two different forms of male antennæ.

Fig. 1*a*.

Fig. 1*a*. Five consecutive joints of left antenna of *I. capensis*, ♂, viewed isometrically.

Fig. 1.

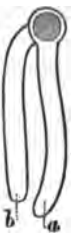

Fig. 1. Two consecutive joints of left antenna of *Idolomorpha capensis*, ♂, seen from the end.

Fig. 2.

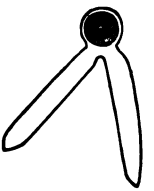

Fig. 2. A single joint of right antenna of *Gongylus gongylodes*, ♂, seen from the end.

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2. *On the presence of a Stridulating Apparatus in certain* Mantidæ. [Read October 2nd, 1878.]

In the *Mantidæ*, as in all other orthopterous insects, a stout, stiff, hard, and tubular longitudinal ridge-like thickening, termed the principal nervure (*h*), divides the tegmina into two unequal portions, which, supposing the wings to be extended at right angles to the body, as in flight, may respectively be described as anterior and posterior.

The smaller anterior portion, technically called the marginal field (M), is bounded in front by another stiff, hollow thickening—the so-called marginal nervure (*m*), constituting the anterior boundary of the organ, and, when viewed from above, usually appearing to be more or less distinctly bevelled in front. On closer inspection, however, this apparently-bevelled edge is seen to be a thin, narrow, and deflexed lamellar expansion (*m'*) of the nervure.

Fig. 1.

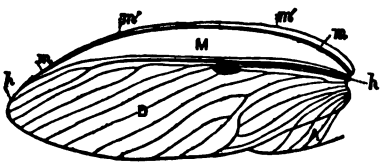

Fig. 1. *Hierodula simulacrum*, ♀. The left tegmen, *h*, *h*, the principal nervure dividing the organ into a larger posterior portion, made up of a discoidal (D) and an anal (A) area, and into a smaller anterior portion, the marginal field (M); *m*, *m*, the marginal nervure; *m'*, *m'*, its lamellar expansion.

In such a species as *Hierodula simulacrum*, when the wings are fully extended, the marginal field of the tegmina slopes downwards and forwards so as to form with the posterior portion (D + A) of those organs an angle of about 130°; but when they are firmly closed, the former is then bent down almost at right angles to the latter, and the consequence is that the lamellar expansion of

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the marginal nervure, which, as we have seen, is also deflexed, comes to be directed nearly 'edge-on' towards the sides of the insect's body.

In *Hierodula simulacrum* it is perfectly unmodified, but in certain other species of the same genus* and in all the *Empusidæ* the lamellar fore margin of the tegmina, now bent down at right angles to the marginal field, is, in males and females alike, converted along a greater or lesser portion of its length into highly indurated, erect, and hard-, smooth-, and blunt-pointed teeth, which are most highly developed in that part which, in the closed organs of flight, is presented 'edge-on' to the abdomen.

Fig. 2.

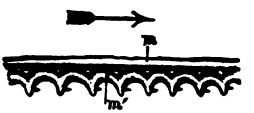

Fig. 2. *Hierodula* (*Sphodromantis*) *gastrica*,† Stål, ♀. A portion of the fore margin of the left tegmen, viewed from in front so as to show the deflexed and toothed lamellar expansion of the marginal nervure. The arrow is supposed to be pointing in the direction of the apex of the wing, towards which, also, the minute setæ, inserted, one on the apical side of each tooth, are all directed. Drawn to scale under a Ross's 3-in. objective. Letters as before.

I have carefully examined a number of insects taken at random (*Corydalis*, *Pneumora*, ♂, many Dragon-flies, &c.), and I find that, whenever the fore margin of the tegmina is serrated or prickly, the points of the serratures or prickles are all invariably sharp and directed towards the apex of the organs, just as in a blade of grass, which, as everybody knows, can easily be drawn through the hand in one direction, but in the other offers a resistance that

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* *Hierodula* (*Sphodromantis*) *gastrica*, from Damara Land; *H.* (*Sphodropoda*) *dentifrons*, from Australia; *H.* (*Rhombodera*) *laticollis*, from Java and Amboina; *H.* (*R.*) *atricoxis* and *H.* (*R.*) *pustulifera*, from an island in Torres Straits, &c.

† When I received this specimen from my late correspondent, Professor Stål, the teeth were all but entirely hidden by a tenacious incrustation, their smooth, polished (and worn?), and brown-coloured tips being alone visible.

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cannot be overcome without tearing and lacerating the skin. Such a mere prickly edge would obviously be useless as a rasp, for, although a scraper could be passed easily enough over it, backwards, the sharp opposing points of the prickles would prove an insurmountable obstacle to its return in the opposite direction.

In all the above-named *Mantidæ*, on the contrary, the serrated tegmina fulfil all the conditions of a good rasp, in that the teeth are all erect and blunt- and smooth-pointed, so as to allow a scraper to traverse them equally easily in both directions—forwards as well as backwards.

I have never doubted that the toothed fore margin of the tegmina in these *Mantidæ* serves in some way or other as a sound-producing apparatus, and I have elsewhere* briefly drawn attention to it, and suggested that it might work by being scraped across the prominent corresponding nervure of the wings; but I have since seen reason for abandoning this idea, and I now consider that the sounds may more probably be produced by the rubbing of the abdomen against the toothed edge,—a view to which the structure of the tegmina in the female of *Gongylus gongylodes*—one of the *Empusidæ*—lends some support. In this species, in the males, the edge of the tegmina is toothed all along as in all the other species that have come under my notice; but in the females, the marginal field of whose abbreviated tegmina is so greatly dilated for the greater part of its length as to extend far beyond and below the level of the insect's body, and to be, consequently, quite out of reach of it, the teeth only commence to be developed where the marginal field becomes sufficiently narrow to bring them within reach of the abdomen. With this single apparent exception, the apparatus appears to be equally well-developed in the two sexes of all the species in which it has been met with.

I have not as yet detected any ridge or ridges specially modified to serve as a scraper, nor would such seem to be needed; least of all in the case of the *Empusidæ*, the postero-lateral angles of whose abdominal segments are produced into more or less conspicuous foliaceous lobes.

It will naturally be asked,† "How is it that nobody has

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* P. Z. S. 1878, p. 583.

† As was done by my distinguished friend Professor Westwood, when I mentioned these observations to him.

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ever heard the *Mantidæ* stridulate, these insects being common enough where good observers have been and still are?" to which I reply, that the species in which the stridulating apparatus occurs are few in number; that a '*Mantis*' is a cautious, timid, and reserved creature, requiring much coaxing and persuasive manipulation to induce it to perform; and that somebody has at last been found who has heard a '*Mantis*' stridulate, and whose evidence is at once confirmatory of my interpretation of the structures as a stridulating organ, and of my later view as to its *modus operandi*.

During the recent meeting of the British Association at Dublin I chanced to get into conversation with Mr. J. Tate, an engineer, who is at present home on furlough from India, and who had been stationed while in that country at Sukkur in Sind. As it seemed to me probable that this officer's professional duties might occasionally have carried him into the desert, I inquired whether he had ever met with *Eremiaphila*,—a singular genus of *Mantidæ*, the members of which are more profoundly modified for a desert life than any other animals known to me,—and, if so, whether he could furnish me with any information as to its habits. He replied, that he had never met with any insects at all answering to my description; but added, without further questioning on my part, that he had frequently seen the more ordinary kinds of '*Mantis*,' and that he still had a particularly vivid recollection of one which flew into the billiard-room one night and was placed upon the green table to make sport for the assembled company, who were all much amused, and apparently not a little astonished, at the creature's curious antics, but especially at the "hissing noise which it kept making" without, as my informant confidently believes, the slightest visible movement of the organs of flight.

If the tegmina were similarly modified in all the species of the family, any attempt to trace the steps by which the modification has originated would be hopeless; but in one of the two groups in which I have detected the apparatus we fortunately have a number of species with unmodified tegmina; in the handling of living and alcoholic specimens of some of which a rustling noise is, as I have noticed, produced whenever the fore margin of the tegmina is accidentally rubbed across the legs or across the projecting anterior nervures of the wings.

This circumstance seeming to suggest that a careful

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examination of some of those species might furnish at least a clue, I have accordingly examined the tegmina of *H. vitrea* and of several other species, and I find that the fore margin of those organs, though smooth and entire to the naked eye, appears under a lens or under a low power to be minutely and irregularly serrated or jagged; the teeth, which are very variable in number, arrangement, and size, being sometimes microscopically small, are all directed outwards and slightly forwards towards the extremity of the organ, just as in the more distinct and regular serratures of the same part in many Dragon-flies, but instead of being rough and sharp, as in these, they are smooth and blunt, often even more or less bulbously enlarged at the extremity, where each is furnished with a minute brown seta, which is also directed towards the point of the wing. In the Indian *Hierodula coarctata*, the teeth are more highly developed and their points extend distinctly beyond the setæ, which project straight outwards from their apical side. There is little doubt that the teeth in this species serve to some extent for the production of sound. On reference to my drawing (fig. 2) of a portion of the tegminal edge of the African *H. gastrica*, in which the apparatus is more highly developed than in any other species of the genus, it will be seen that each of the teeth is in that species also furnished in identically the same position with a similar seta; and the Australian *Hierodula dentifrons* is so far intermediate between these two that it is rather less modified as to its tegmina than the latter.

Similar setæ are also present in all the *Empusidæ*,* in which they are inserted immediately at the base of the hard, polished, and brown-coloured terminal tubercle. They cannot form an essential part of the apparatus; but they are of importance as clearly showing that the teeth of the rasps are morphologically identical with the microscopically small blunt serratures seen in such a form as the Malayan *Hierodula vitrea*, and must consequently have originated from similar small and variable beginnings.

* In several evidently old specimens of *Idolomorpha capensis*, however, they are absent from the teeth of what I consider to be the functional part of the rasp, having apparently been rubbed off by the action of the scraper.

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3. *On a saltatorial* 'Mantis.' [Read October 2nd, 1878.]

At a recent meeting of the Zoological Society, Mr. H. O. Forbes, F.Z.S., kindly placed at my disposal some specimens of *Mantidæ**, which he had collected rather more than a year previously in Portugal, on the banks of the Tagus, and he excited my interest by telling me that one of the species had the power of "hopping like a grasshopper." At the following meeting of the Society he presented me with the promised insects, amongst which was a nymph of an *Ameles*, nearly allied to *A. Spallanzania*, remarkable, as I found on examination, for its relatively long and powerful hind legs, and, even in its dried and shrivelled condition, for its somewhat thickened posterior thighs. I then applied to Mr. Forbes for further particulars about it, and this is the reply that I received to my inquiries:—

"The *Ameles* I obtained on the 9th of December, 1876, in the open spaces in the pine forests, bordering the south-west of the large bay, into which the Tagus opens out just above the city. It was swept from among the *Cistus* (various species) and the scrub oak (*Quercus fruticosa*), especially from the latter. I brought several species (*specimens*) home alive to our rooms in the hotel, and placed them under a bell-jar, some fifteen to eighteen inches in height, in which there was erected a sprig of rosemary. The *Mantises* preferred, however, to sit almost on the bottom of the case, on one of the least elevated of the twigs which were scattered over it. When irritated or moved suddenly, they would hop up three-fourths of the height of the jar, alighting on a twig of the erect branch of rosemary, assuming the attitude of the *Iris oratoria*. On the few occasions I saw either catch its prey, it leapt on the flies; but I had not often the satisfaction of seeing it seize them. When left alone for a while, they invariably made for the lower part of their prison."

Being doubtful, from the use in it of the word "species" for "specimens," whether the above account was intended to apply to other species besides, or to the *Ameles* alone, I put a question to this effect to Mr. Forbes, from whom I have received the following explicit reply:—

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* *Empusa egena*, ♂ ♀ immature; and *Iris oratoria*, ♀ adult; besides the subject of the present note.

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"I spoke of the *Ameles* alone. In confinement the creature, when left quiet, generally sat motionless on a twig near the bottom of the case, but when irritated or stirred by a twig, or when the case was moved suddenly so as to frighten the *Mantis*, it would then hop up, much in the way a grasshopper does."

I have watched the habits of so-called larvæ and pupæ, as well as adults, of *Mantidæ* belonging to several genera and species, and have even bred two or three species from egg-masses laid by females kept in confinement, but have not hitherto met with a single one possessing the slightest ability for executing the considerable leaps* observed by Mr. Forbes in this Portuguese *Ameles;* all having been remarkable rather for the slowness and deliberateness and cautiousness of all their movements, particularly the young.

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4. *On the Hatching Period of* Mantidæ *in Eastern Bengal.* [Read October 2nd, 1878.]

In Europe, according to de Saussure,† the eggs of *Mantis* and *Ameles*, laid in September, are not hatched till the following June, development being arrested by the cold of winter; and the young attain the adult condition in about three months, undergoing in that short period of time a series of not less than seven ecdyses, the first of which takes place at the moment of hatching, the second twelve to fifteen days later, the third fifteen to twenty after that, and the rest at intervals, the precise length of which has not been ascertained, owing to the difficulty of rearing these animals in captivity. Copulation takes place, and the egg-capsules are deposited, in August or September, after which all the insects die off, and no more are to be

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* Mr. F. P. Pascoe, F.R.S., recently obtained a specimen of the same species in Spain, and noticed that it possessed a similar power.

† Mission Sc. au Mex. et dans l'Amér. Cent., Recherches Zool., VIme part, Orthopt. pp. 219, 220.

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seen till the following summer. " Mais," says the author, " sous les tropiques, les choses se passent sans doute autrement. On trouve déjà l'indice de ce fait dans le midi de l'Europe chez les *Empusa*, qui hivernent à l'état de larve et se transforment au printemps suivant."

A *Mantis* sp., which I had had in confinement in my house at Calcutta for about a week, laid, during the night of July 16th—17th, an egg-capsule, from which I found the young emerging early on the morning of August the 4th. A *Schizocephala bicornis*, captured about the same time as the *Mantis*, and confined in the other compartment of the vivarium, deposited an incomplete egg-mass on the very same night, but the young did not quit the eggs till August 16th.

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XXIV. *On the genus* Acentropus. By J. W. Dunning, M.A., F.L.S., &c.

[Read August 7th, 1878.]

In the "Transactions" for 1872, the Society did me the honour to publish a paper "On the genus *Acentropus*," in which, after reviewing the arguments on the question whether the genus was properly referred to the order *Lepidoptera*, discussing its true position in that order, and collecting the scattered observations on the habits of *Acentropus*, I proceeded to consider how many known species there were of the genus; and the conclusion to which my arguments tended was, that *A. niveus, Hansoni, Garnonsii, badensis, germanicus, Nevæ, obscurus* and *latipennis*, were all referable to the same species.

In the "Tijdschrift voor Entomologie" for 1876, p. 1, Heer Ritsema, writing in June, 1875, whilst agreeing that *Garnonsii, badensis, germanicus, Nevæ* and *obscurus* were not entitled to specific rank, and that *A. latipennis* was identical with *Zancle Hansoni*, nevertheless thought there were two distinct species, of which, whilst the males were undistinguishable, one (*A. niveus*, Oliv. = *A. Garnonsii*, Curt.) has a female with rudimentary wings, and the other (*A. latipennis*, Mösch. = *Zancle Hansoni*, Ste.) has a female with fully-developed wings.

In the Proc. Ent. Soc. 1876, p. xxxii, I criticised the reasoning upon which this conclusion was based, and ventured to hazard a conjecture that if Ritsema would persevere in breeding the insect he would obtain both forms of female from larvæ collected at the same spot.

In the Tijd. v. Ent. for 1878 (pp. 81—114), Ritsema returns to the subject, and has now published a life-history of *Acentropus* in its various transformations. In this article the author abandons his former position, describes and figures the fully-winged and the rudimentarily-winged females as two forms of one and the same insect, and has arrived by direct observation at the very conclusion to which I had theoretically arrived in 1872. This memoir,

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though published only in 1878, is dated "December, 1875;" it contains the result of the author's experiments from 1870—75 and no later; so that my prediction of 1876 was no prediction at all, as Ritsema had in fact done in 1875 the very thing which, in ignorance of his observations of that year, I had prophesied he would do.

The following is a short recapitulation of Ritsema's experiences (Tijd. v. Ent. xxi. pp. 81—92):—

On the 14th June, 1870, he first captured the insect (a dozen, all males), at a fish-pond called Kolkje, not far from the village of Overween, near Haarlem, where it had been previously found by Weyenbergh. On that occasion he searched in vain for larvæ, but a fortnight later he found, on *Potamogeton crispus*, in the angle of the leaves against the stem, some white silken cocoons which contained the empty skin of a pupa, having on each side three prominent stigmata. On the 14th July, he found in similar webs some unhatched pupæ; and on the same day a full-grown larva which was busy spinning up. In August he collected more larvæ, which, however, differed considerably in size; he placed them in an aquarium on *P. crispus*, and they remained in the larva state throughout the winter.

At the end of March and in April, 1871, he collected more larvæ, and placed them with the others. At the end of April some of them began to spin, whilst others had not attained half their growth. But about the middle of May, Ritsema went from home, and on his return, plants, larvæ and pupæ were all dead. He had, however, sent a full-grown larva to Heer Brants, which, in the latter half of June, produced a female moth, furnished with rudimentary wings; and this was all that resulted in the season of 1871.

On the 12th May, 1872, Ritsema went again to the Kolkje, and found not only larvæ and pupæ in sufficient numbers, but specimens also of the male imago. Several male moths having previously emerged from the pupæ, on the evening of the 26th May a female was observed moving quietly over the *Potamogeton*, under water; this also had only rudimentary wings. On the next day Ritsema left home, and on his return there was a repetition of the catastrophe of the previous year—plants, larvæ and pupæ were all dead; there were, however, in the aquarium several dead moths, all males but one, and the one female possessed only rudimentary wings.

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Nothing more was done in 1872, and nothing at all in the following year. But in the summer of 1874 Ritsema was staying at Velp, near Arnheim, and in the latter half of August he collected thirty moths, all males, and found both larvæ and pupæ on *Potamogeton crispus*. Shortly before, a fully-winged female *Acentropus* was captured by Father Aghina, in the neighbouring Dominican convent at Huissen; it came in the evening to the light of a lamp, and flew wildly round over the table.

Upon this Ritsema writes (p. 87):—"It is to be noted, also, that in the places where I had collected numberless males of *niveus*, I had not found a single similarly normally-winged female, and from larvæ from one of these places had bred only rudimentarily-winged females; thus it will be seen that the circumstances were very apt to corroborate my idea that the two forms of female did not belong to one species, and to incite me in the following year to breeding from larvæ from the Kolkje, in order to endeavour to obtain proof of my idea."

Accordingly, on the 20th April and the 4th May, 1875, Ritsema again went to the Kolkje, and collected some five-and-twenty larvæ; on the 20th May he obtained two more full-grown larvæ and fifteen pupæ. On the last occasion he also found three dead moths, one male and two females, both with rudimentary wings. During the journey home, a female hatched, in the bottle in which the larvæ and pupæ were carried, and this, too, had only rudimentary wings. When placed in the aquarium, she swam with the help of the long fringes of her middle and hind legs, in an almost perpendicular position, with the head upwards, pushing and jerking round, until at last she fixed herself, by her fore feet and by curving her abdomen, under water on the stalk of one of the plants. Later in the evening, by lamp-light, this female was seen swimming round over the surface of the water, keeping the tip of her abdomen turned upwards. On the 29th May, ten moths hatched, three males, and seven females, all with rudimentary wings; they always emerged in the evening, and the females swam round and round, both on and in the water. On the 1st June, two males and two females hatched, the latter with rudimentary wings; and on the following morning the males were seated above the surface of the water upon the stems of the plants, and the females under water on the *Potamogeton*

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leaves, holding themselves fast by their fore feet, and having the abdomen bent round the leaf. On the leaves were discovered numerous oval greenish-yellow eggs, placed in regular rows side by side; and on the 16th June the first larvæ came out of these eggs, others continued to hatch for about a week, but half the eggs were attacked by a fungus and proved unproductive.

Altogether, from the larvæ and pupæ (forty, more or less) collected at the Kolkje, Ritsema bred eighteen moths, five males and thirteen females. Of these females, and of five more, captured at the same locality, making eighteen in all, not a single one had fully-developed wings, though amongst them there was some difference observable in the extent of development of those organs.

But on the 3rd July, 1875, Ritsema went again to the Kolkje, and in addition to twenty-six males he found a normally-winged female *Acentropus* floating dead upon the water, and soon took four more in the same situation. On careful examination these females were found to agree with Aghina's specimen captured at Huissen. On the 8th July he went again to the fishpond, and found more normally-winged females, thirteen in all. Thus far, then, of these females from the same pond, exactly one-half had rudimentary wings, and the other half were fully winged.

Upon this Ritsema writes (p. 92):—"The discovery at the Kolkje of normally-winged females which agree with *A. latipennis*, had shaken my faith in the existence of two species which should each have its own form of female, and made me incline to Dunning's view (the existence of one species with two forms of female), a view which was supported by a thorough examination of all the specimens collected by me, as well males as females, and was shared by our Micro-Lepidopterist, P. C. T. Snellen."

Of the larvæ born in June, from eggs laid by the rudimentarily-winged females which had come from hibernated larvæ, some were fully grown in August, and began to spin up, having thus taken about six weeks to attain their full size. On the 23rd August a male imago appeared, and on the following day a second male; and these were all the moths which emerged from that batch of eggs in 1875. The rest of the larvæ hibernated. The larvæ taken out of the pond on the 8th July produced four moths between the 17th August and the 15th September; of these, three were males, and one was a female with

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rudimentary wings, but she died without having laid any eggs.

Here the author's record ends; for the paper (dated, as already mentioned, in December, 1875) tells us nothing of his observations in 1876 or 1877. And the result seems to be, that out of thirty-seven females from the Kolkje in 1875, some captured and some bred, but all from the same pond, nineteen had rudimentary wings, and eighteen were fully winged.

The mode of life and the different states are described on pp. 93—105 of the Tijdschrift.

The oval yellowish-green eggs are laid under water, in regular contiguous rows, on the under side of the leaves of *Potamogeton*. In a fortnight, or thereabouts, the young larvæ emerge, and soon begin to feed. Ritsema says (p. 95), that "in the course of a few days some of the larvæ bore into the stalk, or the mid-rib of the leaves, and therein gnaw passages. At what period of their existence they abandon these passages I cannot exactly say, but it is only in their youth that they remain therein." The greater part of the larvæ remain upon the leaves, bend the upper end thereof down, or bite a more or less semi-circular piece out of the edge, spin it fast on the disc of the leaf, and bestow themselves in the habitation thus formed, feeding on the leaf that falls within their reach. Later on, the larva forms a dwelling by spinning together two leaves, usually at the upper end along the edges. The larvæ never leave the water voluntarily. When young they grow very slowly, afterwards more quickly but unequally, so that they gradually begin to differ remarkably in size. After about six weeks some attain their full size, and spin up. The cocoon is placed below the surface of the water, against or partly on the stem of the plant, usually in the axils, but sometimes on the under side of a leaf; it is white and stiff, covered on the outside with pieces of leaf, or by the leaf in the axil of which it rests.

The pupa is of a clear brown colour, darker on the upper than the under side, having three pairs of protuberant conical stigmata or spiracles, a pair on each of the 2nd, 3rd, and 4th abdominal segments. The female pupa is distinguishable from the male pupa by its stouter build, and by a slight difference in the knobs or hooks on the under side of the anal segments, and is furnished with full-sized wing-cases in both the forms of female; but in

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a pupa which will produce a female with rudimentary wings only a small part of the wing-case is occupied, as may be clearly seen shortly before the moth emerges, when the wings are easily distinguishable by their darker colour. The duration of the pupa state of existence is about three weeks.

The greater part of the larvæ, however, hibernate; this they do in various stages of growth, and about the end of March they become active and spread themselves over the food-plant: by the end of April some spin up, and about the middle of May the first brood of the imago begins to appear. A second brood appears in July, and a third in August and September. The spring brood are all from hibernated larvæ, which may be the offspring of any of the three broods of the preceding year. The summer brood, also, are all from hibernated larvæ, and Ritsema conceives that it is to this brood, and this alone, that the normally-winged female belongs, and that the larvæ which are their offspring all hibernate; whilst the autumn brood is from larvæ the offspring of the spring brood of the same year, some of which thus rapidly mature, whilst others of them hibernate (cf. Ent. Mo. Mag. xii. 257). Hence it follows that amongst the larvæ hibernating in any winter there are or may be offspring of all the three broods of the previous year.

I do not quite gather whether the author supposes the females of the summer brood to be always amply winged, or whether both forms of female occur in this brood. But, however this may be, the theory that the female with rudimentary wings belongs to the spring and autumn broods, and that the amply-winged female belongs exclusively to the summer brood, requires further examination. If this be the true view, it would seem that rapidity of larval growth is unfavourable to the alar development of the female imago: it is the larvæ which hibernate earlier in life, and take the longest time to feed up in the spring, which produce the brood of females with fully-developed wings.

Ritsema did not meet with an absolutely apterous female, but the partially-winged and the amply-winged forms were equally fertile and productive.

The imago is described at length (pp. 100—105) by Snellen. Of males he had before him fifty-eight specimens captured and bred by Ritsema, varying in expanse of wing from 11—16 mm., the majority ranging about

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13 mm., and the smallest examples having the fore wings more sharply pointed than the larger ones. Of females, he had before him twenty-two specimens, seven with developed wings and fifteen with rudiments only, the rudimentary wings varying in length from one quarter to one half the length of the abdomen: all the females were larger and more stoutly built than the males, and the fully-winged females were 17—18 mm. in expanse. After an elaborate examination of the insect in all its parts, and whilst admitting that one cannot be astonished at Olivier's having taken it for a *Phryganea*, Snellen thinks that, when once its Lepidopterous affinities were pointed out by Westwood, "obscure ideas respecting the distinctions of the orders of insects, and perhaps a love of contradiction" (p. 106), must have been the main causes for contending that the creature is Trichopterous. "The more accurately the perfect insect is examined, the stronger root does the conviction take, that we have to do with a pretty normally-formed moth, which has comparatively much less congruity with a Phryganid than have some other *Lepidoptera, e. g.*, the *Micropterygina*. Although there are only rudiments of a sucker, the form of the labial and maxillary palpi plainly shows relationship with the Pyralid genera, *Chilo*, *Scirpophaga* and *Schœnobius;* the form of the wings, moreover, agrees with that of the two last-named genera, the clothing of the wings is perfectly Lepidopterous, and finally, when the neuration is looked to, it is seen most plainly that this is wholly and indubitably that of the *Pyralidæ*." The supposed absence of spurs on the mid- and hind-legs, which suggested the name *Acentropus*, would have been a wide departure from the Pyralid type; but now that the spurs have been shown to exist, this difficulty is removed. And I imagine it may now be regarded as finally settled, that the *Acentropodidæ* must take their place as a family of *Pyralidina*.

Snellen mentions (p. 108) that two English specimens, and five Russian received from Baron von Nolcken, have passed through his hands, and he can come to no other conclusion than that all belong to one species, which he holds to be Olivier's *Phryganea nivea*. As to the seven species of von Nolcken, Snellen remarks that all the arguments as to specific distinctness based on the females with perfect wings and the females with rudimentary wings must fall to the ground before the observations

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of Ritsema, and that *Hansoni*, Ste., *Garnonsii*, Curt., *Nevæ*, Kol., *badensis* and *germanicus*, Nolck., must all be united as synonyms with *niveus*, Oliv. He then proceeds (p. 109) to discuss the claim of Möschler's *latipennis*, and shows (as Brown had previously noted) that three out of the six points of difference relied on by Möschler and Herrich-Schäffer are precisely the points in which the sexes of *A. niveus* differ from one another, whilst the other three are not really differences at all, but each occurs in specimens that are undoubtedly *niveus*, and each in others that are undoubtedly *latipennis;* and he adds, that a male of *latipennis* from Sarepta, which he received from Staudinger, was found, on examination, to differ in no single part from Dutch males of *niveus*. "It is, indeed, somewhat more broad and stumpy-winged than the smallest *niveus;* but, compared with the largest specimens, which are connected with others by the gentlest transitions, I find that the latter are even more stumpy-winged than *latipennis*." Finally, Snellen concludes (p. 110) that the claims of *latipennis* to specific rank have nothing but loose screws to rest upon, and that the opinion is well-founded that all the hitherto-described forms of *Acentropus* compose but one species.

Ritsema yields to Snellen, and, in addition to figures of the egg, larva, pupa (Pl. V.) and male imago, with numerous details, he figures (Pl. VI.) both the amply-winged and the rudimentarily-winged female as two forms of *Acentropus niveus*. [Some of the numbers on Pl. VI. do not correspond with the explanation of the figures on pp. 113, 114 of the text.]

On the question of the presence or absence of ocelli (*vide* Tr. Ent. Soc. 1872, p. 129) Ritsema is silent. Snellen speaks of their absence; whilst, as to tibial spurs or spines (*vide ib.* p. 130), Snellen corroborates the observations of Nolcken, Speyer and Westwood, that the spurs, though small and difficult to discover, do really exist.

It will be remembered that Reutti observed (*vide ib.* p. 138) that the wingless female swims on her back under water by night, that coition takes place in the water, the female laying hold of the male and dragging him down with her. Ritsema, however, says (Tijd. p. 95) that "the pairing appears to take place soon after the emergence of the moths, on the surface of the water;" and he suggests (p. 89, n.) that the pair observed by Reutti had been

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alarmed by something or other, or that the female had dived down for the purpose of getting rid of the male.

Ritsema, however, never saw an actual case of copulation, though he was once very near it. But I will give his own words (p. 89, and compare Ent. Mo. Mag. xii. 257):—"At last fortune favoured me, at least so far that, in the evening of the 1st of June, two males and two females hatched, the latter with rudimentary wings; but it was so stormy that evening that I feared I should be unable to observe the copulation if it took place. When in the course of the evening I visited the aquarium, which stood in the garden, it was impossible to hold the lantern for more than a moment, which, however, was just sufficient to see that the males were very nimbly hovering round the females, chasing them on the surface of the water. As the storm continued its violence, I visited the aquarium no more that night. But I had seen enough to make me suppose that copulation takes place, not *in*, but *on*, the water, and that the female dives down to lay her eggs upon the food-plant."

Ritsema assumes that Reutti's account is the result of a single observation, and omits to notice that Reutti's statement is confirmed by Wallengren. It may be that the latter author merely reproduces the former's statement without acknowledgment and without having verified the fact. But if so, how stands the matter?

Ritsema's momentary glance by lantern light on a stormy night was the one solitary opportunity he had of making any observation on this subject, and all he can say is, not that he saw them *in copulâ* on the water, but merely that he saw enough to make him suppose that the act takes place on the surface of the water. Even if his momentary peep revealed them *in copulâ* on the surface, there is nothing to show that the next moment the female did not, as Reutti says, draw down the male with her. And, granted that the act was completed on the surface, we have only one observation by Ritsema against one by Reutti. The most that can at present be said is, that Reutti's observation has not been confirmed by Ritsema.

The larvæ and pupæ live in the water, so that all the moths are born in the water. And Ritsema tells us that the first female found in his aquarium was quietly crawling over the *Potamogeton*, under water; that another female, born in a bottle of water and thence turned into the aquarium, swam about freely and came to rest on the

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plant below the surface; whilst the other females which he bred were observed swimming both on and in the water; and lastly, that the female dives down to lay her eggs under water on the *Potamogeton* leaves, and that, after laying them, she remains under water on the leaves. In short, the female with rudimentary wings dwells principally under water; and though the male is not quite so amphibious, he seems to have no objection to a dive (*vide* Tr. Ent. Soc. 1872, p. 138). Reutti, as reported by Heinemann, says that the female swims on her back under the water; and on this point there is a direct conflict between him and Ritsema, for the latter says that in the evening the female comes to the top and swims about on the surface, with her abdomen turned upwards. And it seems more probable that she should thus attract the males, which sit sluggishly by day on any object near the water and fly briskly in the evening over the surface of the water. But having thus attracted her mate, there is nothing in Ritsema's observation to negative Reutti's account of her drawing him down into the water with her. The subject requires further investigation as regards the wingless female; whilst, as regards the winged form, no one has yet been fortunate enough to detect her *in flagrante delicto.*

On the main point, the specific identity of the two forms, I think no reasonable doubt remains; but it is to be hoped that Heer Ritsema will continue his observations, since there are many, and I am one, who will be satisfied with nothing short of absolute demonstration, by breeding both forms of female from the same batch of eggs, or, which would be equally conclusive, rearing *latipennis* females from eggs laid by a *niveus* mother.

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XXV. *Descriptions of new genera and species of South American* Eumolpidæ, *chiefly from the Amazon region.* By Joseph S. Baly, F.L.S.

[Read August 7th, 1878.]

List of Species.

Eulampra (n. g.) Batesi.
Chrysodina nigrita.
Chalcoplacis femorata.
„ elephas.
„ hirticollis.
„ ingenua.
„ alternata.
„ nitidicollis.
Chalcophyma echinata.
„ cupreata.
Lamprosphœrus diversicornis.
„ fulvitarsis.
Lamprosphœrus biplagiatus.
„ pulcher.
„ generosus.
„ ruficeps.
„ lateralis.
Colaspoides dorsata.
„ ornata.
„ Deyrollei.
Trichochalcea (n. g.) rugata.
Typophorus æneipennis.
Paria vittaticollis.

Genus Eulampra.

Corpus elongato-ovatum, convexum. *Caput* breve, in thoracem fere immersum, *oculis* distantibus; *antennis* corporis dimidio vix longioribus, robustis, articulis ultimis sex compressis et dilatatis. *Thorax* latus, convexus. *Elytra* thoracis basi vix latiora, ad apicem paullo attenuata, substriatim punctata. *Pedes* robusti, breviores; *femoribus* paullo incrassatis; *tibiis* simplicibus; *unguiculis* appendiculatis. *Prosternum* elongatum, ad apicem dilatatum, lateribus sinuatis, apice concavo-emarginato, angulis posticis acutis; disco longitudinaliter concavo; *episterno* antico margine antico recto, angulo externo ad thoracis angulum anticum non producto.

Type, *Eulampra amazona.*

Eulampra differs from *Spintherophyta* in its more elongate body, thickened antennæ in the ♂ sex, thickened thighs, and in the different form of the prosternum.

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Eulampra Batesi.

Elongato-ovata, convexa, nitida, subtus rufo-fulva piceo tincta, supra læte cuprea, antennis (basi fulvâ exceptâ) nigris; thorace sat fortiter punctato; elytris sat fortiter subseriatim, ad apicem striatim-punctatis, interspatiis minute punctatis, ad apicem inter strias leviter convexiusculis.

Long. 2½ lin.

Hab.—Amazons; collected by Mr. Bates.

Head short, rather coarsely punctured, front broad; eyes distant, bordered above with a sunken orbit; clypeus transverse, obliquely inflexed, pentangular, its anterior margin subangulate-emarginate; antennæ rather more than half the length of the body, robust, the six outer joints thickened, compressed and dilated, gradually increasing in width from the sixth to the tenth; the eleventh rather narrower than the tenth, ovate, its apex angulate, acute; five lower joints fulvous, the six outer ones black; labrum fulvous. Thorax twice as broad as long; sides straight and parallel from the base to the middle, thence obliquely rounded and converging to the apex, the hinder angles posteriorly produced, very acute; basal margin deeply concave on either side, the medial portion broadly rounded; disk transversely convex, obliquely deflexed on either side at the apex; surface impressed with deep round punctures, scattered over the disk, rather crowded on the sides, interspaces sparingly impressed with very minute punctures. Scutellum semirotundate-ovate. Elytra very slightly broader at the base than the thorax, slightly attenuated towards the apex, oblong-ovate, convex, not depressed below the base, deeply but not very closely punctured, the punctures indistinctly arranged in longitudinal striæ, which become much more defined at the apex; interspaces very finely punctured, plane, obsoletely convex between the apical striæ. Body beneath rufo-fulvous, more or less stained with piceous; thighs thickened.

Chrysodina nigrita.

Ovata, convexa, nigra, nitida, antennis basi rufo-piceis, thorace fortiter, remote punctato; elytris thorace latioribus, fortiter seriatim punctatis, interspatiis planis, impunctatis.

Long. 1⅓ lin.

Hab.—Pará.

Head perpendicular, wedge-shaped, vertex coarsely

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strigate-punctate, front shining, impunctate, impressed in the middle with a fine longitudinal groove; clypeus wedge-shaped, coarsely rugose-punctate; its anterior margin angulate-emarginate, its apical margin obsolete; antennæ more than half the length of the body, rufo-piceous, the five outer joints thickened and slightly compressed, black. Thorax twice as broad as long; sides straight and obliquely converging from the base nearly to the middle, thence rounded and converging to the apex, the anterior angles acute; basal margin oblique on either side, the medial lobe not produced, regularly rounded; disk convex, strongly deflexed on either side at the apex, sparingly impressed with deep punctures. Scutellum pentagonal, not longer than broad, the apical angle very obtuse. Elytra rather broader than the thorax, convex, broadly but slightly depressed transversely on the outer disk below the humeral callus, rather deeply punctate-striate, the punctures rather distantly placed on the striæ, those on the transverse depression larger and deeper than elsewhere; interspaces plane, impunctate.

Chalcoplacis femorata.

Rotundata, valde convexa, subgibbosa, subtus nitida, rufa, prothorace, femoribus anticis apice, posticis quatuor basi et apice, tibiis tarsisque nigris; supra subopaca, metallico-olivacea, antennis dimidio corporis vix longioribus, fulvis, extrorsum nigris; capite thoraceque minute granulosis, hoc subcrebre punctato; elytris viridi-cyaneis, minute granulosis, subseriatim punctatis.

Long. 2½ lin.

Hab.—Amazons; collected by Mr. Bates.

Head deeply immersed in the thorax, closely granulose, very finely but not closely punctured, lower face sparingly clothed with very short sericeous hairs; front impressed with a very fine longitudinal groove; clypeus depressed, subpentangular, its apex obtuse, its anterior margin concave-emarginate; antennæ about half the length of the body, the five outer joints very slightly thickened, black, the six lower ones pale fulvous; labrum and palpi fulvous, the apical joint of the latter, together with the jaws, black. Thorax nearly three times as broad as long; sides rounded and converging from base to apex, the hinder angles acute, the anterior ones obtuse; disk minutely granulose, covered (but not very closely) with small but distinct round punc-

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tures. Elytra scarcely broader than the thorax, very convex, finely but distinctly substriate-punctate.

Chalcoplacis elephas.

Breviter oblongo-rotundata, valde convexa, subgibbosa; subtus nitida nigra, pedibus abdomineque rufo-testaceis; supra metallico-olivacea, subopaca, antennis (basi rufâ exceptâ) nigris; thorace granuloso, ad latera sub fortiter, disco minute punctato; elytris granulosis, evidenter subremote punctatis, punctis prope suturam subseriatim dispositis.

Long. 4 lin.

Hab.—Brazil.

Head short, granulose, rather sparingly punctured, upper face longitudinally depressed; clypeus semiovate, more closely punctured than the front, its apical margin obsolete, its anterior border slightly sinuate; jaws and antennæ black, the five lower joints of the latter, together with the labrum, rufo-testaceous. Thorax twice as broad as long; sides straight and slightly converging from the base to beyond the middle, thence obliquely rounded and converging to the apex; basal margin oblique and slightly bisinuate on either side, the medial lobe slightly produced, obtusely rounded; upper surface granulose, impressed on either side with round punctures, the disk finely punctured. Scutellum semiovate, granulose, impressed in the centre with a small fovea. Elytra rather broader than the thorax, sides parallel from the shoulder to below the middle, thence regularly rounded to the apex; above convex, subgibbose before the middle, granulose, sparingly and finely, but distinctly punctured, the punctures near the suture arranged in irregular longitudinal striæ.

Chalcoplacis hirticollis.

Rotundata, valde convexa, obsolete gibbosa, nitida, subtus nigra, pedibus abdominisque apice rufo-fulvis; supra metallico-cœrulea, antennis fulvis; capite subopaco, viridi tincto; thorace minute punctato, pilis adpressis fulvis vestito, lateribus subopacis, metallico-viridibus; elytris sat fortiter, confuse, ad apicem subseriatim punctatis.

Long. 2½ lin.

Hab.—Amazons.

Head deeply buried in the thorax, plane, sparingly

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clothed with very short adpressed fulvous hairs; very finely granulose, front impressed with a fine longitudinal groove; clypeus transverse, depressed, distinctly punctured; labrum, palpi and antennæ fulvous, the last more than half the length of the body, filiform, the five outer joints indistinctly thickened, stained at their apices with black. Thorax nearly three times as broad as long; sides rounded and converging from base to apex, very indistinctly angled behind the middle, the hinder angles acute, the anterior ones subacute; disk shining, very minutely but not closely punctured, metallic blue; the lateral border opaque, minutely granulose, metallic green, the apical margin also narrowly edged with the same colour. Scutellum subpentangular, metallic green, sparingly clothed with adpressed sericeous hairs. Elytra scarcely broader than the thorax, convex, rather strongly punctured, the punctures placed without order over the general surface, but arranged in longitudinal rows at the apex and along the extreme outer border, each puncture with a single, very short adpressed hair, visible only under a deep lens; the extreme apex tinged with metallic green; inflexed limb concolorous with the disk, nearly plane, concave only at its base.

Chalcoplacis ingenua.

Rotundata, valde convexa, subgibbosa, subtus cum antennis fulva, nitida, prothorace mesosternoque nigris; supra subopaca, metallico-viridis, minute granulosa; capite thoraceque minute punctatis; elytris cœruleo tinctis, prope suturam sat regulariter, seriatim, ad latera magis confuse punctatis.

Long. 2 lin.

Hab.—Amazons; collected by Mr. Bates.

Head deeply immersed in the thorax, very finely granulose, sparingly clothed with adpressed fulvous hairs, finely but not closely punctured, front impressed with a very fine longitudinal groove; clypeus wedge-shaped, its anterior border concave-emarginate, its apex ill-defined; rufo-fulvous, stained at the apex with metallic green; labrum and palpi fulvous; jaws piceous; antennæ scarcely more than half the length of the body, pale fulvous, filiform, the five outer joints indistinctly thickened, stained at their apices with piceous. Thorax more than twice as broad as long; sides rounded and converging from base to apex,

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rather more quickly converging near the latter, all the angles acute; disk minutely granulose, finely but distinctly punctured. Elytra scarcely broader than the thorax, very convex, more strongly punctured than the thorax, the punctures arranged in nearly regular striæ on the inner disk, less regularly placed towards the outer margin; interspaces plane, finely granulose; inflexed limb concave.

Chalcoplacis alternata.

Rotundata, valde convexa, subgibbosa, nitida, subtus nigra, abdomine obscure rufo; supra cyanea, antennis brevioribus fulvis, articulis 7mo, 9mo, 10mo et 11mo nigris; thorace minutissime, subremote punctato, lateribus viridi tinctis; elytris minute subseriatim punctatis.

Long. 2$\frac{2}{3}$ lin.

Hab.—Amazons, Cayenne.

Head deeply buried in the thorax, plane, subopaque, very finely punctured, tinged with metallic green; clypeus wedge-shaped, the sutural lines separating it from the face very fine, sometimes entirely obsolete; labrum and mouth black; antennæ scarcely half the length of the body, the five outer joints very slightly thickened; fulvous, the 7th, 9th, 10th and 11th joints black. Thorax nearly three times as broad as long; sides rounded and converging from base to apex, more quickly converging before the middle, the anterior angles obtuse, the hinder ones acute; disk very finely and rather remotely punctured, the extreme lateral margin narrowly edged with metallic green. Elytra slightly broader than the thorax, very convex, subgibbose, rather more distinctly punctured than the thorax, the punctures arranged in irregular longitudinal striæ; inflexed limb concave.

Chalcoplacis nitidicollis.

Subrotundata, valde convexa, nitida, nigro-ænea, cœruleo tincta, tarsis fulvis; supra læte viridi-ænea, labro antennisque rufo-fulvis, his extrorsum nigris; thorace disco minute et sparse punctato, lateribus magis crebre et magis fortiter punctatis; elytris sat fortiter, subseriatim punctatis.

Long. 2$\frac{1}{2}$ lin.

Hab.—Cayenne.

Head rather strongly but not very closely punctured,

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the vertex nitidous, the lower face granulose, lower portion of front with a longitudinal depression; clypeus not longer than broad, slightly depressed, subpentangular, its anterior margin obsoletely bidentate; antennæ two-thirds the length of the body, five outer joints slightly thickened, black; jaws also black; labrum and palpi rufo-fulvous. Thorax rather more than twice as broad as long; the apical margin deeply excavated; sides nearly straight and very slightly converging from the base to just behind the middle, thence obliquely rounded and converging to the apex, the anterior angles produced, acute, the hinder ones thickened, subacute; disk convex, nitidous, distantly and minutely punctured, sides near the lateral margin granulose, rather closely covered with large round punctures. Scutellum semirotundate-ovate, its apex acute, its surface sparingly impressed with minute punctures. Elytra slightly broader than the thorax, convex, rather strongly punctured, the punctures arranged in ill-defined longitudinal rows, which are most distinct and regular on the sides and apex; inflexed limb nearly plane, its middle portion slightly oblique.

Chalcophyma echinata.

Rotundata, valde convexa, nitida, subtus picea, cupreo micans, tarsis sordide fulvis; supra cuprea, antennis fulvis, articulis intermediis piceis; capite crebre impresso-strigoso, labro piceo-fulvo; thorace lateribus angulatis, disco rude rugoso, crebre et profunde foveolato; scutello semirotundato; elytris rude punctatis, punctis ad apicem striatim dispositis, interspatiis tuberculis acutis numerosis, nec non prope suturam et ad apicem cretis brevibus longitudinalibus instructis, femoribus posticis quatuor subtus unispinosis.

Long. 2 lin.

Hab.—Amazons.

Head rotundate, front and upper face impressed with a longitudinal groove, closely covered with fine impressed strigæ; clypeus campanulate, its apex acute, its anterior border truncate; labrum and palpi piceo-fulvous; antennæ slender, filiform, fulvous, the 5th, 6th and 7th joints, together with the apex of the 11th, pale piceous. Thorax nearly three times as broad as long; sides angulate just below the middle, thence obliquely converging to the apex, the latter acute; disk convex, closely covered with large round deeply-impressed foveæ, their interspaces coarsely

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rugose. Elytra broader than the thorax, slightly attenuated at the apex, very convex, slightly excavated transversely behind the humeral callus, the latter thickened; coarsely punctured, the punctures arranged in longitudinal rows at the apex; interspaces closely covered with large, somewhat compressed, acute tubercles, which here and there on the inner disk and at the apex coalesce, and form longitudinal costæ.

Chalcophyma cupreata.

Subrotundata, valde convexa, nitida, subtus nigra, metasterno pedibusque nigro-cyaneis, tarsis fulvis, anticis piceo tinctis; supra læte cuprea, antennis piceis, basi fulvis; antennis nigris, his basi labroque fulvis; capite impresso-strigoso, sat fortiter punctato, clypeo viridi-æneo; thorace lateribus viridi-metallicis, obsolete bidentatis, profunde punctato, punctis ad latera sat crebre dispositis, disco sparsis, hic illic irregulariter congregatis; elytris valde convexis, pone basin leviter gibbosis, fortiter, subseriatim punctatis, interstitiis duobus intra latus subcostatis, limbo laterali extremo limboque inflexo metallico-viridibus.

Long. $1\frac{3}{4}$ lin.

Hab.—Amazons, Santarem.

Head short, rather deeply punctured, face impressed between the eyes with a longitudinal groove, whole surface closely covered with impressed strigæ, those on the upper face obliquely converging to the medial groove; clypeus rather broader than long, trigonate, its anterior border obsoletely sinuate; labrum and palpi pale fulvous, the jaws black; antennæ slender, more than equal to the body in length, filiform, the three lower joints fulvous, the rest piceous. Thorax nearly as broad as the elytra; sides rounded and diverging from the base to the middle, thence obliquely converging to the apex, obsoletely bidentate, the anterior angles acute; disk transversely convex, very deeply and coarsely foveolate-punctate, the foveæ rather crowded on the sides, more scattered and collected in irregular patches on the disk, the interspaces smooth, very faintly strigose near the anterior angles; the general surface bright cupreous, the lateral margins edged with bright metallic green. Elytra very convex, subgibbose below the base, very strongly punctured, the punctures arranged in ill-defined longitudinal striæ, placed in re-

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gular rows at the apex and on the lateral margin, the two outer interspaces thickened and subcostate. Four hinder femora, each armed beneath with an acute tooth.

Lamprosphærus diversicornis.

Rotundatus, valde convexus, niger, nitidus, antennis piceis, articulis 8vo et 9mo fulvis, 6to, 7mo, 10mo et 11mo nigris, tarsis nigro-piceis; thorace minus nitido, minute granuloso, fortiter punctato, punctis ad latera concinne-disco disperse-dispositis; elytris subseriatim punctatis.

Long. 1¾ lin.

Hab.—Amazons (Bates).

Head granulose, subopaque, impressed with large, shallow, round punctures; clypeus semiovate, its apical margin obsolete, its anterior edge obtusely bidentate; antennæ half the length of the body, the five outer joints slightly thickened; pale piceous, the 6th, 7th, 10th and 11th black, the 8th and 9th fulvous. Thorax scarcely more than twice as broad as long; sides obliquely rounded and converging from base to apex, all the angles acute; basal margin oblique and slightly sinuate on either side; upper surface finely granulose, subnitidous on the middle disk, impressed with large round punctures, crowded on the sides, rather more distant on the middle disk. Scutellum semirotundate-ovate, its apex acute. Elytra broader than the thorax, slightly attenuated towards the apex, convex, punctate-striate, the punctures less regularly placed on the inner disk; interspaces plane, very minutely punctured, slightly convex near the lateral margin; inflexed limb oblique.

Lamprosphærus fulvitarsis.

Subrotundatus, valde convexus, subgibbosus, subtus metallico-viridis, nitidus, tarsis fulvis; supra minus nitidus, nigro-plumbeus, sæpe viridi micans, antennis nigris, basi sordide fulvis; thorace remote, minute punctato; elytris subseriatim punctatis.

Long. 2½ lin.

Hab.—Brazil.

Head remotely punctured; front impressed with a fine longitudinal groove; clypeus wedge-shaped, more closely punctured than the upper face, its anterior margin slightly

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sinuate, metallic green; antennæ slender, filiform, the two lower joints obscure fulvous, the rest black; labrum metallic green. Thorax more than three times as broad as long; anterior margin deeply concave; sides straight and slightly converging from the base to behind the middle, thence obliquely converging to the apex, all the angles acute; basal margin oblique and slightly bisinuate on either side, the medial lobe broadly and obtusely rounded; disk very minutely granulose, sparingly impressed with minute punctures. Scutellum subtrigonate, its sides rounded, its apex acute. Elytra scarcely broader than the thorax, very convex, obtusely gibbose before the middle, slightly excavated near the base close to the scutellum, finely but distinctly punctured, the punctures arranged in ill-defined longitudinal rows; interspaces plane; inflexed limb horizontal, plane.

Lamprosphærus biplagiatus.

Rotundatus, valde convexus, niger, nitidus, antennis piceis, basi obscure fulvis; pedibus piceis, tarsis piceo-fulvis; thorace subcrebre punctato; elytris sat fortiter punctato-striatis, interstitiis ad latera et ad apicem convexis; utrisque plagâ magnâ subrotundatâ, ante medium positâ, ornatis.

Long. 1½ lin.

Hab.—Amazons (Bates).

Head piceo-æneous, coarsely punctured; clypeus much longer than broad, wedge-shaped, subpentangular, its apical angle obsolete, its anterior margin bidentate; antennæ more than two-thirds the length of the body, filiform, the four lower joints obscure fulvous, the rest piceous; labrum fulvous, its anterior border deeply emarginate; jaws nigro-piceous. Thorax nearly three times as broad as long; sides obliquely rounded and converging from base to apex, very oblique before their middle, all the angles acute; basal margin oblique and obsoletely bisinuate on either side; disk deeply punctured. Scutellum semirotundate, its apex acute. Elytra rather broader than the thorax, attenuated towards the apex; convex, rather strongly punctate-striate, the interspaces plane, convex at the apex and near the lateral margin; each elytron with a large subrotundate rufous patch, extending from just below the basal margin nearly to the

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middle; inflexed limb oblique, concave at its extreme base.

Lamprosphærus pulcher.

Rotundatus, valde convexus, nitidus, subtus piceus, abdominis apice pedibusque rufo-fulvis; supra rufer, antennis fulvis, harum articulis 7mo, 10mo et 11mo infuscatis; thorace distincte, subremote punctato, apice et lateribus nigro-piceis; scutello elytrisque nigris, his seriatim punctatis, utrisque vittâ latâ a basi ad longe pone medium extensâ margineque apicali rubris.

Long. 1½ lin.

Hab.—Amazons; collected by Mr. Bates.

Head strongly but not closely punctured, obscure rufous, tinged with metallic green; sparingly clothed with fine adpressed silky hairs; clypeus subcampanulate, its anterior margin slightly concave; antennæ slender, filiform. Thorax more than twice as broad as long; sides rounded and converging from base to apex, all the angles acute, the hinder ones produced slightly backwards; disk distinctly but not closely punctured, obscure rufous, the apex and sides, together with the extreme basal margin, tinged with metallic green. Scutellum semiovate, shining black, with a metallic tinge. Elytra broader than the thorax, convex, punctate-striate, black, each with the extreme apical margin, together with a broad vitta extending from the base to far below the middle, rufous.

Lamprosphærus generosus.

Rotundatus, valde convexus, nigro-piceus, rufo tinctus, nitidus, capite thoraceque obscure rufis, hoc disci medio remote punctato, anguste piceo limbato, antennis nigris, basi sordide fulvis; elytris sat fortiter, subseriatim punctatis.

Long. 1⅔ lin.

Hab.—Amazons; collected by Mr. Bates.

Head rather coarsely but not very closely punctured; clypeus longer than broad, pentangular, its apical angle acute, its anterior border bidentate; antennæ nearly two-thirds the length of the body, the five lower joints obscure fulvous or fulvo-piceous, the rest black. Thorax nearly three times as broad as long; sides rounded and converging from base to apex, all the angles acute; basal

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margin oblique on either side, slightly sinuate on each side the medial lobe, the latter obtusely rounded; upper surface shining, obscure rufous, narrowly edged with piceous, middle of disk remotely punctured. Scutellum semiovate. Elytra strongly but not closely punctured, the punctures arranged in longitudinal rows on the sides and towards the apex, less regularly placed on the inner disk, interspaces plane. The colouring of the under surface varies in intensity in different individuals, in some specimens the legs and apex of abdomen being rufo-piceous.

Lamprosphœrus ruficeps.

Rotundatus, valde convexus, nitidus, subtus niger, abdominis apice pedibusque rufis; supra metallico-cœruleus, capite rufo, vertice cyaneo tincto, antennis pallide fulvis; thorace sat fortiter, minus remote punctato; elytris fortiter seriatim punctatis; metallico-purpureis, apice extremo rufo.

Long. 1⅛ lin.

Hab.—Amazons; collected by Mr. Bates.

Head rather coarsely punctured; clypeus ill-defined, its anterior margin obsoletely bidentate; antennæ scarcely more than half the length of the body, slender, filiform, pale fulvous, the apical joints stained with piceous. Thorax nearly three times as broad as long at the base; sides rounded and converging from base to apex, the anterior angles acute, slightly recurved, the hinder ones subacute; the basal border distinctly margined, oblique and very obsoletely bisinuate on either side, the medial lobe obtusely rounded; disk rather strongly but not closely punctured. Scutellum trigonate, its apex acute. Elytra convex, metallic purple, the extreme apical margin rufous; much more strongly punctured than the thorax, the punctures arranged in longitudinal rows at the sides and towards the apex, rather less regularly placed on the inner disk; interspaces plane, obsoletely convex near the apex, thickened and subcostate near the lateral margin.

Lamprosphœrus lateralis.

Rotundatus, convexus, rufo-fulvus, nitidus, capite rufo-piceo, æneo tincto, antennis pedibusque fulvis; thorace sat fortiter punctato; elytris subseriatim, ad apicem seriatim-punctatis, limbo laterali (apice excepto) a basi ad apicem

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ampliato, limboque inflexo nigris; pectore medio abdominisque basi piceis.

Long. 1½ lin.

Hab.—Amazons, Pará.

Head trigonate, strongly punctured, face impressed between the eyes with a longitudinal groove; clypeus wedge-shaped, its apex acute, its anterior margin sinuate; antennæ four-fifths the length of the body, slender, filiform. Thorax more than twice as broad as long; sides rounded and converging from base to apex, the anterior angles acute; above transversely convex, deeply but not closely punctured. Scutellum semiovate, its apex acute. Elytra broader than the thorax, narrowed towards the apex, convex, rather strongly punctate-striate, the striæ not well-defined on the anterior disk, arranged in double rows behind the middle, but forming only single rows at the extreme apex. Apices of hinder tibiæ incurved in the ♂.

Colaspoides dorsata.

Late ovata, valde convexa, sordide fulva, nitida, thorace subremote sat fortiter punctato; elytris fortiter seriatim punctatis, plagâ magnâ communi a basi fere ad apicem extensâ, utrinque emarginatâ, piceâ instructis.

Var. A. Elytrorum plagâ plus minusve obsoletâ.

Long. 1⅓ lin.

Hab.—Amazons, Pará.

Head finely but distinctly punctured, impressed on either side above the eye with a few fine strigæ; clypeus trigonate, its anterior margin truncate; eyes black; antennæ filiform, pale fulvous. Thorax twice as broad as long; sides rounded and converging from base to apex, all the angles acute; disk strongly but not closely impressed with oblong punctures, interspaces sparingly impressed with very minute punctures, only visible under a strong lens. Scutellum semirotundate, its apex acute. Elytra convex, broader and more strongly punctured than the thorax, the punctures arranged in ill-defined longitudinal rows; interspaces plane; the piceous patch on the dorsal surface is often less distinct, being sometimes separated in four ill-defined spots, two on each elytron, and sometimes nearly obsolete; in some specimens the lateral margin of the elytron is edged with piceous.

This insect closely resembles in general form and size the species belonging to the genus *Lamprosphærus*.

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Colaspoides ornata.

Ovata, convexa, castanea, nitida, antennis extrorsum nigris; thorace subfortiter punctato; elytris fortiter, subcrebre punctatis, pallide castaneis, dimidio antico (margine externo excepto), et utrinque plagâ ovali subapicali, flavis ornatis.

Long. $3\frac{2}{3}$ lin.

Hab.—Brazil.

Head coarsely punctured, front impressed with a longitudinal groove; clypeus scarcely broader than long, its apical margin obsolete, its anterior border concave, produced on either side into a short tooth; jaws nigro-piceous; five outer joints of antennæ slightly compressed, black. Thorax more than twice as broad as long; sides rounded and converging from base to apex, all the angles mucronate; disk subremotely impressed with distinct but not coarse punctures, the interspaces minutely punctured. Scutellum semirotundate-ovate, its apex acute. Elytra broader than the thorax, slightly attenuated towards the apex, rather strongly punctured, the punctures arranged in irregular longitudinal striæ; interspaces finely punctured.

Colaspoides Deyrollei.

Ovata, convexa, nigro-picea, nitida, abdominis limbo pedibusque piceo-rufis, capite fortiter punctato, vertice obscure rufo, labro antennisque rufo-fulvis; thorace sat fortiter punctato, margine apicali, vittâ discoidali et utrinque maculâ prope marginem lateralem obscure rufis; elytris nigris, sat fortiter subseriatim punctatis, utrisque fasciâ latâ, vix infra basin positâ, ad suturam abbreviatâ, alterâ prope medium, antice et postice erosâ, ad suturam abbreviatâ plagâque subapicali trigonatâ, ad marginem adfixâ, flavis ornatis.

Long. 4 lin.

Hab.—Brazil, New Friburg; a single specimen, formerly in the collection of the late A. Deyrolle.

Head rotundate, vertex coarsely but not very closely punctured; interspaces on either side indistinctly elevate-strigose, front impressed with a large round fovea; clypeus not larger than broad, pentangular, the apical margin obsolete, the anterior border bidentate, its surface closely covered with coarse deep punctures. Thorax twice as broad as long; sides straight and nearly parallel from the

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base to just behind the middle, thence obliquely rounded and converging to the apex, all the angles mucronate; upper surface deeply but not closely punctured, the puncturing finer on the middle disk; interspaces minutely punctured. Scutellum semiovate, acute, its disk obscure rufous. Elytra broader than the thorax, ovate, slightly attenuated at the apex, convex, strongly but rather distinctly punctured, the punctures confused on the inner disk, arranged in ill-defined longitudinal rows on the sides and apex, the interspaces minutely punctured; each elytron with three large yellow patches, one at the base, transverse, separated from the basal and lateral margins by a narrow line, but abbreviated some distance before reaching the suture, its hinder border erose; a second near the middle, much narrower, commencing just within the outer margin and terminating on the inner disk, at about the same distance from the suture as the former one, its anterior and posterior edges irregularly erose; lastly, a third, subapical trigonate; inflexed limb obscure rufous.

Genus Trichochalcea.

Corpus anguste oblongo-ovatum, valde convexum, pube sericeâ vestitum. *Caput* thoraci insertum; *facie* perpendiculari; *oculis* rotundato-ovatis, intus leviter emarginatis; *antennis* corporis dimidio vix æquilongis, basi filiformibus, articulis 5 ultimis paullo incrassatis; *palpis* articulo ultimo acuminato. *Thorax* transversus, lateribus marginatis. *Elytra* oblonga, thorace latiora, convexa, rugosa, confuse punctata. *Pedes* breves, robusti; *femoribus* subampulatis, *anticis* incrassatis, subtus angulatis; *tibiis* a basi ad apicem ampliatis, compressis, *anticis* basi incurvatis; *unguiculis* appendiculatis. *Prosternum* oblongum, fere planum, basi truncatum; *episterno* antico antice convexo, sulco inter episternum et prosternum distincto.

Type, *Trichochalcea rugata*.

The present genus belongs to the second division of the family; it agrees with *Meroda* in the appendiculated claws and in the form of the thickened anterior pair of legs, but differs in the pubescence clothing the upper surface of the body, and in the absence of the notch on the outer edge of the four posterior tibiæ; the same characters, together with the appendiculated claws, separate it from *Typophorus* and its allies.

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Trichochalcea rugata.

Anguste oblongo-ovata, valde convexa, cuprea, nitida, griseo sericea, antennis labroque piceo-fulvis; capite thoraceque crebre rugosis, hoc transverso, lateribus rotundatis; elytris oblongis, rude rugosis, irregulariter transversim elevato-strigosis.

Long. 3 lin.

Hab.—Brazil.

Head short, closely rugose-punctate, front impressed with a longitudinal groove; clypeus not distinctly separated from the upper face, its anterior border truncate; labrum and palpi obscure rufo-fulvous, the latter stained with piceous; jaws black; antennæ scarcely half the length of the body, the basal joint thickened, subclavate, the 2nd short, nodulose, the 3rd to the 6th slender, filiform, nearly equal in length, the five upper ones shorter, thickened, slightly compressed and forming a slender elongated club; all the joints stained with piceous. Thorax twice as broad as long; sides rounded, converging in front, the hinder angles mucronate, the anterior ones acute; apical margin produced anteriorly, sinuate on either side, the basal border margined, very slightly oblique and faintly bisinuate on either side; disk convex, slightly excavated on either side at the base, surface closely rugose-punctate, rather sparingly clothed with adpressed griseous hairs. Scutellum semirotundate-ovate, slightly concave, its surface granulose-punctate. Elytra broader than the thorax, oblong, convex, rather closely covered with adpressed griseous hairs, very coarsely rugose-punctate; interspaces thickened and forming very irregular transverse rugæ and wart-like excrescences, which cover the whole surface. Legs short, robust, the anterior pair strongly thickened, the under surface of the anterior thighs angulate; all the tibiæ increasing in thickness from base to apex, compressed and tricarinate, the anterior pair incurved at the base.

Typophorus æneipennis.

Subelongatus, subcylindricus, niger, nitidus, pedibus fulvis, coxis, genubus, tibiis apice, tarsis et mesopectore pallide piceis, capite thoraceque rufo-testaceis; antennis (basi fulvâ exceptâ) nigris; elytris viridi-æneis, distincte

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punctato-striatis, punctis apicem versus minutis; femoribus posticis subtus dente minuto armatis.

Long. 1½ lin.

Hab.—Amazons, Pará.

Head smooth and shining, sparingly impressed with a few very minute punctures, only visible under a deep lens; front between the eyes impressed with a small fovea; clypeus not distinctly separated from the face; antennæ filiform, five lower joints obscure fulvous, the rest black. Thorax not broader than long, subcylindrical, sides slightly rounded, nearly parallel at the base, slightly converging at the apex; disk shining, nearly impunctate, impressed with a few very fine punctures, only visible under a strong lens. Scutellum semi-ovate, rufo-piceous. Elytra much broader than the thorax, oblong, convex, transversely impressed below the basilar space, finely but distinctly punctate-striate, the punctures near the apex very minute; interspaces plane, impunctate; on either side of the apical segment is an ill-defined rufo-piceous patch; outer edge of all the tibiæ frequently stained with piceous.

Paria vittaticollis.

Elongata, subcylindrica, piceo-fulva, nitida, antennis extrorsum piceis; thorace lævi, impunctato, medio vittâ nigrâ, a basi fere ad apicem extensâ instructo; elytris anguste oblongis, convexis, infra basin transversim excavatis, tenuiter punctato-striatis, utrisque prope suturam, maculâ basali subrotundatâ flavo-fulvâ extus nigro marginatâ ornatis; lineâ suturali nec non maculâ parvâ oblongâ disco medio vix pone medium sitâ, nigris.

Long. 2 lin.

Hab.—Bahia; collected by Mr. Edwin Reed.

Head exserted; face perpendicular, vertex smooth, impunctate, its middle portion with a very fine, ill-defined raised longitudinal line; front impressed on either side with a longitudinal groove; eyes subreniform; antennæ more than two-thirds the length of the body, filiform, the five outer joints stained with piceous. Thorax scarcely longer than broad; sides rounded and diverging from the base to behind the middle, thence nearly straight and very slightly converging to the apex; basal margin narrowly edged with piceous; disk shining, impunctate, a

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narrow vitta extending from base to apex, black. Scutellum pale piceous. Elytra much broader than the thorax, narrowly oblong, convex, transversely excavated below the basilar space, finely punctate-striate, the punctures at the base near the suture, those on the transverse depression, and those on the lateral stria, larger and more deeply impressed than the rest; the fulvous spot at the base of each elytron is only a few shades lighter in colouring than the general surface, and in some specimens is scarcely visible; it is bounded within by the black sutural line, and externally by a short, curved, black vitta, which commences on the basal margin, and terminates on the subbasilar excavation.

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XXVI. *Descriptions of several new species of* Myriopoda *of the genera* Sphærotherium *and* Zephronia.

By Arthur G. Butler, F.L.S., F.Z.S., &c.

[Read August 7th, 1878.]

The following species have been added to the National Collection since the beginning of the year 1877, and several of them are of great interest, being quite abnormal in structure.

Sphærotherium, Brandt.

Sphærotherium crassum, n. sp.

Pale castaneous; the dorsal segments for the most part, with their posterior margins, dusky or blackish; the second to seventh dorsal segments with blackish lateral wings; mouth, front of head, eyes and legs greenish.

Head smooth, shining, slightly depressed on each side of the central area, deeply sinuated in the centre behind; coarsely punctured, densely in front and sparsely towards the back; nuchal plate rather short, rugulose, with a series of punctures on each side of the anterior margin; dorsal segments dull; *first dorsal segment with broad and thin lateral laminæ, having a well-defined marginal ridge;* second to eleventh segments rugose in front; last segment finely punctured behind, slightly compressed, with well-marked marginal rim.

Length 1 inch, 3 lines; width 7 lines.

Fianarantsoa, Madagascar (Rev. W. D. Cowan).

Seems to be allied to my *S. stigmaticum*, but differs in the rugose anterior portion of the dorsal segments and the absence of the embossed triangular spot on the last segment. The differences of colour may be due to the specimen having been sent over in sawdust damped with spirits of wine.

Sphærotherium angulatum, n. sp.

Dark reddish castaneous, with the anterior portion of each of the dorsal segments ochraceous; under surface, legs and antennæ testaceous; eyes greenish testaceous.

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Head shining, rugose in front, smooth, with a few scattered coarse punctures towards the back, regularly and rather broadly sinuated behind; nuchal plate moderately long, smooth, with a series of rather coarse punctures along the anterior margin; dorsal segment smooth and shining, their anterior portions densely covered with coarse but very shallow punctures; *first dorsal segment with scarcely a trace of lateral laminæ, but with coarse submarginal punctures and a strongly-defined marginal ridge;* second to eleventh segments with the anterior portion of their lateral wings finely and densely punctured, and with a distinct marginal rim; terminal segment with *its posterior third slightly compressed, so as to form a rounded projecting central point, which gives the profile outline a distinctly angular appearance,* also sparsely and finely punctured; marginal rim linear.

Length 1 inch, 3 lines; width 8 lines.

Rockhampton, Queensland. (Two examples, dry and in spirits.)

General aspect of the enlarged figure of *S. convexum*, as given by Dr. Koch (Die Myriapoden, tab. xiv. fig. 27), but much redder; the lateral laminæ of the first dorsal segment reduced to a minimum, the head smoother, the front of the nuchal plate less angular, and the last dorsal segment with distinctly angular profile outline.

Sphærotherium lamprinum, n. sp.

Dark reddish olivaceous; under surface, legs, antennæ and eyes greenish; front of head blackish; anterior borders of the dorsal segments and a few scattered irregular blotches rather paler than the ground-colour.

Brilliantly polished; head rugose in front, coarsely and sparsely punctured towards the back; deeply sinuated behind, with the anterior edge of the sinuation bracket-shaped; nuchal plate short, smooth, slightly depressed in the centre; first dorsal segment with broad and thin laminæ, having a thick anterior marginal ridge; *second to eleventh segments with the anterior margins of their lateral wings very oblique, with distinct terminal or apical rims;* last segment unusually oblique, with linear marginal rim.

Length 10 lines; width 5 lines.

Fianarantsoa, Madagascar (Rev. W. D. Cowan).

Differs from medium-sized examples of *S. neptunus* in

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its redder colour, much more brilliantly-polished surface, shorter nuchal plate, and the much more oblique anterior edges of the lateral wings of the dorsal segments.

Sphærotherium reticulatum, n. sp.

Piceous; the borders of the segments reddish castaneous; head, nuchal plate, and anterior ridge of the first dorsal segment spotted with black; under surface, legs and antennæ testaceous; eyes green.

Head smooth, shining; coarsely punctured, densely in front and sparsely towards the back; deeply sinuated behind as in the preceding species; *dorsal segments covered with impressed reticulations;* first dorsal segment with gradually-formed lateral laminæ and strongly-defined marginal ridge, thicker towards the front; *dorsal segments gradually increasing in length from the second to the ninth and then gradually decreasing,* so that the inferior margin of the Myriopod, when viewed in profile, is distinctly convex; anterior margins of the lateral wings very oblique, with linear marginal rim.

Length 8½ lines; width 4½ lines.

Madagascar. (Two examples.)

Zephronia larvalis, n. sp.

Pale olive green, clouded (near the back of the dorsal segments, on the head and along the front of the nuchal plate) with dark green; posterior borders of the segments reddish, traversed by submarginal yellow lines; front of head lilacine-reddish, nuchal plate also reddish, with yellowish margins; under surface, legs, antennæ and eyes pale green; last dorsal segment with an irregular blackish central spot.*

Head smooth, sparsely but very coarsely punctured, deeply sinuated behind, and with a distinct protuberance in front of the sinus; nuchal plate rather short, *with a strongly-defined anterior ridge,* the impression behind which is coarsely punctured; posterior portion of the nuchal plate with rather abruptly convex outline and *with two well-marked central tubercles divided by an abbreviated impressed longitudinal line;* first dorsal segment with a well-defined, thickened marginal ridge, behind which runs an oblique and flat surface, continuous with

* Perhaps an individual peculiarity.

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the lateral laminæ, and forming an angle behind with *an impressed transverse band which bounds the anterior edge of the superior surface of the segment;* remaining segments with their lateral wings less oblique than usual; terminal segment rather short, oblique, with no marginal rim.

Length 7½ lines; width 3½ lines.

Torres Straits (Rev. J. S. Macfarlane).

The very unusual peculiarities in the structure of the head, nuchal plate and first dorsal segment will readily distinguish this species from all others hitherto made known to science.

Zephronia atrisparsa, n. sp.

Pale olivaceous, mottled with dark green and sprinkled all over with small round black spots; posterior margins of the segments reddish; legs, antennæ, eyes and head dark green.

Head rugose in front, smooth, shining and sparsely punctured towards the back, its posterior margin slightly concave but *not distinctly sinuated; nuchal plate smooth, very broad*, sparsely punctured, and with an irregular series of coarse punctures along its anterior margin; first dorsal segment unusually depressed, with a strongly-defined transverse impressed line, the marginal ridge of lateral laminæ feebly developed; all the dorsal segments coarsely but sparsely punctured, excepting along their posterior borders; lateral wings with very oblique anterior margins; terminal segment short, rounded, rugulose, with scarcely a trace of a marginal rim.

Length 1 inch, 2 lines; width 5 lines.

Bombay (Dr. Leith).

Readily separable from *Z. nigrinota* by its much shorter and broader nuchal plate: it is also much more heavily spotted with black.

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XXVII. *Notice of a small collection of* Coleoptera *from Jamaica, with descriptions of new species from the West Indies.* By Chas. O. Waterhouse.

[Read September 4th, 1878.]

The present paper has reference to a small collection of *Coleoptera* from Jamaica, made in that island by Mr. J. J. Bowrey, and recently exhibited at the Westminster Aquarium.

The collection contained sixty-five species, some of which are rare, and several new to science. The types of the new species will be found in the British Museum collection. There are, moreover, nine species, which, although perhaps new, I have not ventured to describe, as I am in doubt on this point.

The following is a list of the species:—

Cicindela trifasciata, Fabr.
Casnonia limbata, sp. n.
Belonuchus agilis, Er.
Lioderma 4-gentatum, Fabr.
Dermestes sp.
Chelonarium sp.
Cyclonotum sp.
Neleus interstitialis, Esch.
Phanæus belzebul, Fabr.
Trox suberosus, Fabr.
Lachnosterna fervida, Fabr.
Antichira meridionalis (Reiche).
Rutela glabrata, Fabr.
Cyclocephala cerea, Burm.
„ tetrica, Burm.
Ligyrus juvencus, Fabr.
Strategus titanus, Fabr.
Phileurus valgus, Fabr.
Gymnetis lanius, Gory.
Psiloptera torquata, Dalm.
Polycesta depressa, Linn.
Fornax sp.
Chalcolepidius Silbermanni, Chevr.
Pyrophorus plagiophthalmus, Germ.
Photinus sp.
Photurus sp.
Calopteron bicolor, Linn.
Apate muricata, Fabr.
Epitragus sp.
Taurocerus cornutus, Fabr.
Zophobas morio, Fabr.
Helops mutabilis, sp. n.
Helops propinqua, sp. n.
Hoplonyx uniformis, sp. n.
Copidita lateralis, sp. n.
Caryoborus sp.
Præpodes amabilis, sp. n.
„ vittatus, Linn.
„ sphacelatus, Oliv.
Lachnopus aurifer, Fabr.
Pachnæus litus, Germ.
Molicorynes longimanus, sp. n.
Sphenophorus sericeus, Fabr.
Parandra lævis, Latr.
Sternodontes damicornis, Linn.
Mallodon sp.
Elateropsis lineata, Linn.
„ fuliginosus, Fabr.
Achryson surinamum, Linn.
Chlorida festiva, Linn.
Eburida tetralacta, White.
Elaphidion irrorata, Fabr.
„ spinicorne, Drury.
Hypermallus transversus, White.
Cyllene crinicornis, Chevr.
Neoclytus Hopei, Lap. & Gory.
Ptychodes trilineatus, Linn.
Lagochirus araneiformis, Linn.
Colaspis smaragdula, Oliv.
Graptodera plebeja, Ol.
Omophoita 10-notata, Dej.
Cerotoma denticornis, Fabr.
Eurypepla brevilineata, Bohem.
Daulis sanguinea, Linn.
Procula Douéi, Muls.

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GEODEPHAGA.

Casnonia limbata, sp. n.

Nigra, nitida; elytris piceis, maculâ subapicali limboque pallide flavis, dimidio basali fortiter seriatim punctato; antennis fuscis, basi obscure testaceis; pedibus flavis, genubus infuscatis.

Long. 3¼ lin.

Closely allied to *C. pennsylvanica*, but relatively shorter. Head distinctly shorter and broader, but otherwise of the same form. Thorax a little shorter and a little more swollen in the middle. Elytra a little more parallel, obscure pitchy, with a very narrow margin and a subapical triangular spot on each yellowish; the punctures forming the lines at the basal half are much stronger than in *pennsylvanica*, the punctures nearly touching each other near the base.

BOSTRICHIDÆ.

APATE MURICATA, F.

Mr. Bowrey found this species on the cashew tree.

HETEROMERA.

TAUROCERUS CORNUTUS, Fabr.

Among Mr. Bowrey's insects was a very fine male example of this species, which differs in the form of the cephalic horns from that figured by Olivier. These horns curve outwards, and near the apex are somewhat dilated and deeply excavated above, the extreme apex being acute.

Helops mutabilis, sp. n.

Niger, nitidus, oblongus; supra cyaneus, elytris vel æneo-viridibus vel purpureis; capite crebre evidenter punctato; thorace minus nitido, parum transverso, depressiusculo, crebre subtiliter punctulato, lateribus medio parum arcuatis; elytris thorace vix latioribus, fortiter striatis, striis fortiter punctatis, interstitiis sat convexis.

Long. 4¼—5¼ lin.

Allied to *H. cæruleus*, and somewhat of the form of that species, but relatively shorter and more parallel sided.

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Antennæ as long as the elytra, very slender, the 4th to 8th elongate, nearly equal, the 9th a trifle shorter, 10th elongate, but a little wider at its apex, 11th a trifle shorter, arched on the inner side. Head moderately thickly punctured, the punctures in the middle distinct, those on the vertex and clypeus much finer. Thorax about one-third broader than long, very little convex, rather dull, very finely but moderately thickly punctured, the anterior angles a little prominent, the sides slightly arcuate in front of the middle, scarcely sinuate before the posterior angles which are nearly right-angles, there is a slight punctiform-impression on each side close to the base. Scutellum semicircular, with a few fine punctures. Elytra scarcely broader than the thorax, sub-parallel, rather flattened on the back, the striæ nearly all equally strong, the punctures in them strong and not very close together, the interstices gently convex, those at the sides a little more so. Legs moderately robust, shining. Anterior margin of the prosternum with coarse punctures.

The colour of the elytra varies, and is sometimes blue, violet or green. The male has the middle of the 1st, 2nd and part of the 3rd segments of the abdomen impressed.

Found on Pimento.

Helops propinquus, sp. n.

Niger, nitidus, supra cyaneus; capite subtiliter punctulato; thorace crebre evidenter punctato, angulis anticis paulo porrectis, posticis rectis; elytris convexiusculis; striatis, striis fortiter punctatis, interstitiis sat convexis.

Long. $2\frac{3}{4}$ lin.

Very close to the preceding, but smaller, more convex, and the thorax is much more distinctly punctured. The sides of the thorax are nearly straight, a little narrowed in front, the anterior angles very prominent and acute. Scutellum smooth. Elytra rather convex, rather more rounded at the apex; striæ very deep, and all equally so, the punctures in them very strong and a little closer together than in the preceding species, the interstices not visibly punctured. Sides of the 1st and 2nd, and part of the 3rd segments of the abdomen strongly and moderately thickly punctured.

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Hoplonyx uniformis, sp. n.

Oblongus, niger, supra opacus, subtus nitidus; capite crebre subtiliter punctato; thorace lævi, postice haud angustato, angulis posticis rectis, basi utrinque sinuato; elytris thorace parum latioribus, sat parallelis, convexis, striatis, striis haud profundis seriatim punctulatis, interstitiis parum convexis; femoribus subtus ante apicem dente obtuso armatis.

Long. 6½ lin.

General appearance of *H. striatus*, but with the thorax nearly the width of the elytra. Antennæ rather short, three-fifths the length of the elytra. Head finely and closely punctured. Thorax about two-fifths broader than long, convex, with no visible punctuation, a little narrowed in front, the anterior angles obtuse, the sides behind the middle straight, posterior angles right-angles, the base is trilobate, the lateral lobes slight, the mesial one stronger. Scutellum more shining, very finely punctured. The striæ of the elytra are rather fine but well marked, the punctures in them are small and not very close together. The anterior femora have a tooth below, near the apex, but the tooth is not prominent, it is rather the result of an emargination at the apex.

Copidita læta, sp. n.

Flavo-testacea, nitida, tenue pubescens; oculis nigris; fronte violaceo tinctâ, crebre punctato; thorace crebre subtiliter punctato, supra inæquali, obsolete quinque fusco-maculato, postice biconstricto, ante medium bene rotundato; elytris thorace ¼ latioribus, pallide violaceis suturâ marginibusque testaceis; pectore abdomineque griseo-æneis.

Long. 5½ lin.

Forehead distinctly and rather thickly punctured. Thorax very thickly and rather finely punctured, a trifle longer than broad, with five very slight impressions above, the sides are very strongly rounded in front, constricted in the middle and immediately before the posterior angles. The elytra have scarcely any trace of costæ, the punctuation is fine, distinct, thick, but not crowded.

Hab.—St. Domingo.

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Copidita lateralis.

Pallide flava, tenuissime griseo-pubescens; oculis nigris; elytris vittâ latâ marginali pallide griseo-violaceâ.

Long. 5 lin.

Head rather broad, finely but distinctly, and rather thickly, punctured. Antennæ a little shorter than the elytra. Thorax a little broader in front than the head including the eyes, a trifle longer than its greatest width, moderately narrowed posteriorly, very thickly, finely and obscurely punctured, the sides in front of the middle are rather strongly rounded. Elytra two-fifths broader than the thorax and four times longer, convex, very closely and finely-rugosely punctured; each elytron has three costæ, two on the back and one lateral, the greyish-violet stripe commences at the second dorsal costa and extends to the margin.

Hab.—St. Domingo, Jamaica.

Copidita elegans, sp. n.

Elongata, flavo-testacea, tenue pubescens; oculis nigris; thorace creberrime evidenter punctato, basi angustato, lateribus antice bene rotundato; elytris tricostatis, creberrime subtiliter punctulatis, lineâ tenui laterali violaceâ.

Long. 3¾ lin.

Relatively more narrow and elongate than any of the preceding, with longer and more slender antennæ, and with the thorax more narrowed behind. Head very closely and rather finely and distinctly punctured, with two shallow impressions between the eyes. Thorax distinctly longer than broad, very closely and (compared with its allies) rather strongly punctured; strongly narrowed behind the middle, almost constricted, very prominently rounded at the sides in front. Elytra closely and very finely punctured, with a bluish-violet narrow stripe extending from the shoulder nearly to the apex.

Hab.—St. Domingo.

Copidita tenella, sp. n.

Flavo-testacea, breviter griseo-pubescens; oculis nigris; thorace longitudine haud latiori, leviter convexo, basin versus paulo angustato, lateribus antice rotundatis; elytris creberrime punctulatis, griseo-nigris, violaceo-

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tinctis, suturâ marginibusque tenue testaceis; abdomine basi griseo.

Long. 3½ lin.

Very close to *C. lateralis*, but differs (besides in coloration) in the form of the thorax, its greatest width being a little more removed from the anterior angles: the sides also at this part are slightly angular; the punctuation is less close, more distinct and rather stronger. The elytra have the same costæ, the punctuation is rather stronger and more distinct, the pubescence appears rather shorter and less silky.

Hab.—St. Thomas (Lieut. T. W. Sawyer).

Copidita simplex, sp. n.

Pallide flava, tenue griseo-pubescens; oculis nigris; thorace leviter convexo, æquali, postice parum angustato, lateribus antice leviter arcuatis; elytris vittâ latâ laterali nigro-griseâ.

Long. 3½ lin.

Very close to the preceding, but differs in having the thorax a trifle narrower, more gradually widened in front, and to a much less extent. In *C. lateralis* the enlargement at the anterior part is rather sudden, but not quite so much so as in *C. læta*.

Hab.—St. Bartholomew.

Copidita lineata, sp. n.

Æneo-cyanea, nitida; elytris æneis, subtiliter rugulosis, lineis nonnulis tenuibus albis; tibiis tarsisque piceis.

Long. 3¾ lin.

Shining, bluish-green. Head very closely, finely but distinctly punctured, with three small shallow foveæ between the eyes. Thorax at its greatest width a little narrower than the head across the eyes, as long as broad, gently narrowed behind, shining, very delicately punctured on the disk, very thickly and distinctly punctured towards the sides, there is a distinct fovea in the middle of the posterior margin, the sides are gently rounded in front of the middle. Elytra rather dull, very finely rugulose-punctulate, the suture and two fine lines on each elytron are marked by white pubescence, there is also near the base an indication of another white line.

Hab.—Jamaica (Gosse).

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Copidita rubricollis.

Brevior, nigro-cyanea; thorace flavo-rufo; elytris cyaneis, subopacis, crebre punctatis, suturâ, lineâ tenui dorsali marginibusque albis.

Long. 3¾ lin.

Head black, tinged with æneous, distinctly and rather thickly punctured; eyes not much prominent; antennæ rather short. Thorax reddish-yellow, a trifle longer than broad, gently convex, very lightly impressed on each side of the disk, moderately narrowed behind, moderately thickly and distinctly punctured, rounded at the sides in front. Elytra three times as long as the thorax, and a quarter broader, violet-blue, with strong crowded punctuation; the suture, a fine dorsal line and the margins white; there is a well-marked blunt lateral costa.

Hab.—St. Thomas (Gosse).

RHYNCHOPHORA.

Prepodes amabilis, sp. n.

Statura *P. vittati*, niger, nitidus; elytris suturâ vittâ latâ longitudinali marginibusque læte aureo-viridibus, vel cyaneis, humeris magis angulatim productis.

Long. 10—12 lin.

Form of *P. vittatus*, but with the humeral angles of the elytra more prominent; the punctuation of the elytra is rather stronger and there is less rugosity at the apex. The elytra have the suture, a broad stripe and the margins bright metallic pale golden-green or pale bluish. The sides of the body and of the prosternum are also metallic blue.

Var. 1. Elytra without stripes; each puncture of the elytra with a small green scale in the middle.

Var. 2. Elytra with a blue sutural stripe, and orange dorsal and lateral stripes.

If this species varies as much in colour as does *P. vittatus*, there will be little to separate it but the more prominent shoulders and the stronger punctuation. The punctures on the elytra have each a small blue scale in the middle, which does not seem to be the case in *vittatus*.

The following notes on the varieties of *P. vittatus* will be useful:—

1. Head, thorax and elytra entirely clothed with greyish-white, or pale green-golden scales; the suture pale

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green or white, the dorsal and lateral stripes pink, the lateral stripe elongate and generally united to a subapical spot.

2. Head, thorax and elytra not entirely clothed with scales. Elytra with a sutural pale green or white stripe, the dorsal stripe pink, vermilion or ochre; the lateral stripe vermilion or ochre, varying in length.

3. Like the above (No. 2), but with a short stripe between the dorsal stripe and the subapical spot.

4. Sutural stripe absent; with two dorsal stripes, the outer one more or less abbreviated, sometimes united at the base with the inner stripe; there is also a subhumeral stripe and a short subapical spot.

I think it doubtful whether the following is to be considered as a distinct species or not. It appears to be distinct, but having only a single example I should not venture to name it.

Præpodes vittatus, var. (?)

Black; a spot at the posterior angles of the thorax, the scutellum, the suture of the elytra and a lateral stripe white.

CRYPTORHYNCHIDÆ.

SOPHORORHINÆ.

Molicorynes, gen. n.

Rostrum very long, gently curved, the antennal scrobes commencing near the apex and extending to the eye. Antennæ very long and slender, the scape very slightly clubbed at the apex; the 1st joint of the funiculus short obconic, the 2nd long and slender, twice as long as the 1st, the 3rd to 7th rapidly diminishing in length, the club small and not distinctly jointed. Eyes moderate, not prominent, moderately separated above and below. Thorax gently convex, narrowed in front, the ocular lobes moderately prominent. Scutellum distinct. Elytra a little broader than the thorax at the base, gradually narrowed posteriorly, rounded at the apex, gently convex. Prosternum deeply channelled; mesosternum very deeply channelled, the sides much elevated and prominent in front, the channel not closed posteriorly, so that the rostrum when at rest reaches the anterior margin of the metasternum. The 2nd, 3rd and 4th abdominal segments

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equal, the sutures straight. Legs long, especially the anterior; the anterior coxæ very large and prominent; femora not carinated, furnished with an acute tooth beneath about one-third from the apex; tibiæ curved, spurred at the apex; tarsi spongy beneath; the 1st and 2nd joints of the anterior pair with additional long hair, the 1st joint rather long and slender, the 2nd joint as long as broad (in the ♂ it is one-third longer than broad), the 3rd joint transverse, bilobed.

Molicorynes longimanus, sp. n.

Fuscus, plus minusve sabuloso-squamulatus; rostro subtiliter ruguloso-punctato, antennis gracilibus; thorace antice arcuatim-angustato, crebre fortiter punctato, punctis squamiferis; elytris basi thorace paulo latioribus, postice paulo arcuatim-angustatis, fortiter striato-punctatis, interstitiis per-parum convexis, dense squamosis, humeris obtusis, guttâ parvâ pallidâ notatis.

Long. corp. 6⅓ lin., rostr. 3⅓ lin.

In form between *Balaninus* and *Macromerus*. Rostrum densely and rather finely rugulose-punctate, smooth at the apex, a little widened and flatter at the base, funiculus of the antennæ sparingly set with stiff hairs. Thorax a little longer than broad, broadest at the base, gradually narrowed in front, densely and strongly punctured, the larger scales have a tendency to form a stripe on each side extending from the eyes to the shoulders. Elytra moderately convex, gradually but not much narrowed to the apex, which is obtuse, no anti-apical calosity; the scales are very dense posteriorly, those on the shoulder form a paler spot, and there is a tendency to form an oblique patch on each elytron a little before the middle. The legs are long, especially the anterior pair, the scales form a small patch on the outer side of the femora.

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XXVIII. *On the habits and affinities of* Apocrypta *and* Sycophaga, *of the Hymenopterous family* Agaonidæ, *with description of a new species of* Apocrypta *from the figs of Ficus Sycomori of Egypt.*

By Sir Sidney Smith Saunders, C.M.G.

[Read November 6th, 1878.]

Dr. Coquerel has described and figured three very remarkable insects, which he named *Apocrypta paradoxa*, *A. perplexa* and *Sycocrypta coeca*, in Guérin's "Révue de Zoologie" for 1855 (2e série, tome vii. 365 and 462), obtained from the figs of *Ficus terragena* in the Island of Mauritius. Conceiving these insects to be in an immature condition, he sought for them repeatedly during several successive months and always found them in the same condition, exhibiting the three types by hundreds mixed up together. They were all destitute of eyes or ocelli, whereof he could find no trace whatever (aucun vestige), nor of wings or elytra; neither was he able to discover any maxillæ or palpi, although armed with powerful mandibles.

Finding that these strange beings retained the same forms for a long period, and observing in one of them a certain resemblance to the *Scleroderma* of Latreille (which the *Sycocrypta*, in the structure of its head and thorax, serves to suggest, although essentially differing, not only in the antennæ, legs and abdomen, but more especially in not being *aculeate*), Dr. Coquerel considered them to belong to the *Heterogyna* of Latreille, upon whose supposed affinities he comments; speaking of these insects as being, in his opinion, "les femelles aveugles et aptères de quelque mâle ailé et inconnu;" and as "étranges *parasites*, condamnés à une obscurité éternelle, renfermés qu'ils sont dans une cavité close de toutes parts, privés d'ailleurs des organes de la vue."

In company with them he also found a considerable number of supposed *Chalcidites*, which, as he observes, "selon toute apparence s'étaient développés à leurs dépens," and living promiscuously (pêle-mêle) with the

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aforesaid; being met with, like the former, among the viscid matter surrounding the seeds ("drupes"), as well as within the same ("dans l'intérieur des drupes elles-mêmes," p. 367).

These supposed parasitic associates were furnished with eyes and wings, and some of them had been seen hovering about the figs in the first instance. How they were to obtain their eventual liberation from such closed prison without their blind victims being simultaneously emancipated when the figs burst or decayed; or how these latter captives, condemned to perpetual durance and obscurity, were to deposit their ova in other figs; is not explained.

Dr. Coquerel describes and figures this *Chalcis* ? (*sic*) under the name of *C. explorator;* in whose wing the short curvate vein emanating from the anterior margin (or more precisely from the cubitus) shows a close affinity with *Blastophaga;* whereof one species (the *B. Sycomori*) is figured and described by Professor Westwood, together with the allied genus *Sycophaga* (of which *S. crassipes* is the type), in our Transactions for 1837 (Vol. II., pp. 220, 222, Pl. XX. fs. 4 and 5); but Coquerel's insect differs from *Blastophaga* in the structure of the antennæ, as well as in the length of the ovipositor, which he describes as about twice the length of the body; whereas it is very short in the latter, being less than half as long as the abdomen. The mouth-parts are not adverted to by Dr. Coquerel; but in *Blastophaga* the mandibles are furnished with a remarkable appendage (Westwood, loc. cit. fig. 4, b—f), which is not found in *Sycophaga,* to which Coquerel's supposed *Chalcis* is more closely allied in its antennæ and ovipositor.

Walker, in his "Notes on *Chalcidiæ*" (Part IV. p. 60), pronounces this to be an *Idarnes,* and repeats Coquerel's figures of *Apocrypta* and *Sycocrypta;* speaking of these as exhibiting the most aboriginal structure of the *Agaonidæ,* which he characterizes in the aggregate as the most rudimentary form of the *Chalcidiæ.* He subsequently refers to *Idarnes* as allied to *Blastophaga* and *Sycophaga,* and as resembling the latter in having "a long oviduct" (p. 64).

But *Blastophaga* (as the name implies) is not of carnivorous habits; it is described by Gravenhorst as piercing the germs of the fig with small round holes, the interior of which germs is devoured by the larvæ, and

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wherein he believed they undergo their metamorphosis.* Hasselquist, also, in his "Iter Palæstinum" (edited by Linnæus in 1757), says of his *Cynips Ficus*, "germina excavata ab illo reperi, et in quovis fere germine unum reconditum." The like habit applies to *Sycophaga*, as shown by some of the specimens now exhibited, where several are seen emerging from the seeds of the sycamore fig.

The *Cynips Caricæ* of Hasselquist, found in the same figs with his *C. Ficus*, was considered by him as possibly the other sex of the latter (an præcedens ex altero sexu? An diversa species? *Iter*, p. 425); although he minutely describes the *oviduct* of each; the comparative length of which (given in the *C. Caricæ* only) is stated to be "corpore duplo longior." These were subsequently united by Linnæus in his 10th edition of the "Systema Naturæ" (1758), wherein he refers to Hasselquist's Nos. 111 and 112, under the name of *Cynips Psenes*.

Hasselquist's specimens were obtained near Smyrna, from the "Ficus Caricæ *orientalis*" (Linn. loc. cit.); but those of Gravenhorst, all females, were derived from the Ficus Caricæ of the Tyrol; and, in describing his *Blastophaga grossorum*, ♀, from that locality, he expresses his inability to pronounce an opinion as to its generic identity with the aforesaid, having never seen Hasselquist's specimens, nor found a sufficiently accurate description thereof.

Professor Westwood has since shown (loc. cit.) that the *Cynips Sycomori*, ♀, of Egypt (ticketed as such in the Linnæan cabinet with Hasselquist's No. 113 by Linnæus himself), is a true *Blastophaga*. But in the *B. grossorum* the oviduct is described as "longitudine dimidiæ aut tertiæ partis abdominis," and in *B. Sycomori* as "abdominis dimidii fere longitudine;" that of *Cynips Caricæ*, Hasselq., being, as aforesaid, *twice the length of the body*: his *C. Ficus* is stated to be entirely *red* (corpus totum rufum), all the examples of *C. Psenes* in the Linnæan cabinet being rufescent, with an elongate oviduct; whereas, in the European species, the females, as described by Gravenhorst, and as exemplified in specimens from Montpellier, received from M. Jules Lichtenstein, are *glossy-black* (nigroænius, Gr.). Thus, the *B. gros-*

* "Disquisitio de *Cynipe Psene* Auctorum, et Descriptio *Blastophagæ* novi *Hymenopterorum* generis." *Beiträge zur Entomologie;* Breslau; Part I. 1829.

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sorum of Europe must be regarded as perfectly distinct from the Oriental type represented by the *Cynips Psenes* of Linnæus.

In none of these instances is any clue afforded to the *males*. But the Montpellier specimens were associated with many *apterous* individuals, somewhat approximating to the *Sycocrypta* of Coquerel; while an allied species of *Apocrypta* (now exhibited) has been recently found in the sycamore figs of Egypt, consorting in broods with the *Sycophaga crassipes;* as Coquerel's *Apocryptæ* were met with in the Mauritius figs of *Ficus terragena* in company with his *Idarnes:* and the habits of all, as emanating from the seeds, being identical, it would seem to be conclusively shown hereby that the *apterous* forms are, in reality, the *males*, and not, as Coquerel conceived, the females of some unknown males; thus leaving his *Idarnes* equally without a partner: nor does it appear that any other species of this genus or family has hitherto been wedded to a recognized mate.

In another allied genus, the *Sycobia* of Walker (Notes on Chalcid, p. 60), found in the figs of the *Ficus Indica* of Hindostan, a brood of "*neuters?*" or "*workers?*" has been described, which are *apterous* ("Alæ nullæ"), with "long curved mandibles like those of *Scleroderma*," and having "some resemblance to *Apocrypta* and *Sycocrypta* in the structure of the abdomen," furnished "with two apical appendages which equal it in length and resemble the *cerci* of the *Dermaptera*." They have eyes and 8-jointed (?) antennæ, with the 1st joint much incrassated. The same inferences point to these as the *males*.

In the Montpellier specimens, associated with *Blastophaga grossorum* ♀, Gr., the abdomen of the males is sharply deflexed and entirely concealed by doubling beneath the thorax; whereas in Coquerel's *Sycocrypta* it is turned *upwards* instead of *downwards*, passing over the thorax and projecting far beyond the head ("l'extrémité bilobée du thorax répose sur le sol, l'abdomen se dirige *en haut*, et dépasse de beaucoup la tête." Coq. l. c. p. 424). In the aforesaid males of *Blastophaga*, it consists of a large globose basal distention, constituting four segments; which are followed by three more, forming a short tube, gradually tapering to an obtuse apex;* the

* Dr. Coquerel, while assigning *five* segments to the globose section of the abdomen in his *Sycocrypta*, considers its attenuated prolongation to

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head, however, is not elongate-oval, posteriorly truncate, as in *Sycocrypta*, but nearly circular, rather broader at the base and notched in front at the insertion of the antennæ, which are very short, triarticulate, fleshy, and tumid at the apex; their mouth being furnished with short, powerful mandibles, strongly bidentate at the extremity, while exhibiting distinct *black eyes* placed on each side of the disc. The thorax is much elevated and compact throughout, somewhat broader than the head; the posterior tibiæ being strongly outcurved, and the thorax thus raised and adjusted by the posterior tarsi. Their colour is stramineous at first, becoming rufo-fulvous when desiccated; and their total length, with the abdomen extended, is about 2 mill.; that of *Sycocrypta coeca* being stated at from 4 to 4½ mill.

No *Blastophagæ*, nor any species corresponding with *Sycocrypta* or *Apocrypta perplexa*, were met with in the Egyptian sycamore figs, in company with the other type furnished with the peculiar caudal processes, considered by Dr. Coquerel as bronchial appendages, the large tracheæ abutting thereon; and, in accordance with the analogies witnessed in other instances, this Egyptian species, differing from *A. paradoxa* in the structure of the antennæ, thorax, tibiæ and abdomen, as described in the sequel, and domiciled in broods with *Sycophaga crassipes*, ♀, must obviously be regarded as its *male*.

Their life history appears to be as follows: Among hundreds of sycamore figs examined during the months of September and October, *all* the females found in these figs were denuded of their wings; being apparently *hibernating* females of the previous year, which obtain access to the interior by a minute hole which they make in the so-called "eye" of the fig, for the purpose of depositing their eggs in the seeds *from within*. For thus penetrating themselves through the exterior, their acute falcate mandibles are admirably adapted. *Every* small unripe green sycamore fig contained from three to six of these dead or effete wingless females. Possibly those figs not thus attacked fall off the tree; to provide against which, as well as to promote maturity, caprification is said to be resorted to in the case of the domestic fig. Towards the

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consist of *five* more; ascribing *eight* segments to *A. paradoxa*, and only *four* or *five* (quatre à cinq) to *A. perplexa*.

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end of October the new brood appears. When the figs ripen in November, the young and active females gnaw a series of small holes round the original aperture, and issue therefrom; but eventually the entire tuft of stamens falls in, and affords a readier means of egress. The Arabs are accustomed to make an incision in each fig at an earlier period, apparently for a similar purpose, in lieu of caprification;* and in such slit figs, when ripe, no winged females are met with, which avail themselves of such opening to evade, leaving the males only, which are found *dead* within. Few of these have escaped mutilation in their legs or caudal appendages from the potent mandibles of their blind comrades. They are apt to assume at times a crouching attitude by doubling their abdomen beneath the thorax (like the *Blastophagæ*); their compressed segments being entirely concealed thereby, the caudal appendages widely projecting on either side, and the posterior legs extended backwards; thus appearing as if cut in half.

SYCOPHAGA CRASSIPES, Westw., Mas.

Flavo-testacea, elongata, aptera, coeca.

Long. corp. 2½—3½ mill.

(Abdominis segmentis laxis nonnunquàm usque ad 4½ mill. productis.)

Caput elongatum, compressum, latum, pone mandibulas transversè depressum, angulatum, posticè emarginatum; disco striis rufis 5, maculâque irregulari prope antennarum basin nigrâ. *Antennæ* albidæ, carnosæ, 3-articulatæ, anticè utrinque porrectæ; articulo basali valdè dilatato, compresso; 2do brevi, subtrigono; apicali duplò longiore, ovato-conico. *Mandibulæ* robustæ, tridentatæ, dentibus crassis. *Maxillæ* nullæ. *Palpi* obsoleti. *Oculi* desunt.

Thorax capite dimidio longior, gibbus; *prothorace* capitis ferè magnitudine, subtùs abbreviato, lateribus obliquè fissis, rufo-striatis; *mesothorace* parvo, scutiformi; *metathorace* vix majore, posticè latiore, rotundato. *Alæ* nullæ.

* While this paper is passing through the press, the following account of the operation performed by the Arabs on these figs has been received:—"An incision, not very deep, and about half an inch long, is made with a small knife across the centre of the fig, so that a little of the milky juices may exude; this causes them to ripen very rapidly, makes the fruit much better, and allows the insects to escape from within. This cutting process is effected when the fruit is very small and green. Figs which have not undergone this operation would be quite unfit to eat."—E. HASELDEN.

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Pedes breves; trochanteribus magnis; femoribus parum incrassatis; tibiis parvis, apice dilatatis, spinosis; tarsis tenuibus, 5-articulatis; articulo basali longiore; 2do 3^tio^ et 4to brevissimis; extimo elongato, unguiculis magnis valdè recurvis, pulvillo acuminato subtùs producto.

Abdomen elongatum, flexile, laxum, compressum, segmentis 7; basali parvo, semicirculari; 2° anticè profundè emarginato; reliquis latitudine longitudinis, retractilibus; podice caudulâ longiusculâ, exarticulatâ, flexili, basi robustâ, deindè compressâ, deniquè filiformi, posticè deflexâ, apud trachearum aditum affixâ, disco marginibusque glabris, utrinque munito; genitalibus sæpè prominulis, dilatatis, subtùs retrò deflexis.

Habitat cum *Sycophagâ crassipede* commixtis, in Ægypti Ficus Sycomori grossis.

Blastophaga grossorum, Grav., Mas.*

Straminea (vel rufo-fulva postquàm desiccata sit), aptera, oculis nigris, abdomine basi ventricoso.

Long. corp. 2 mill.; lat. ½ mill.

Caput subrotundum, posticè latius, convexum, anticè truncatum, fronte angulariter excavato, disco levissimè punctato; oculis lateralibus, subrotundis. *Antennæ* brevissimæ, albidæ, carnosæ, ad marginem anticum ubi excavatum insertæ, 3-articulatæ; articulo 1mo parvo, cylindrico; 2do paulò elongato, dimidio basali latere excavato; extimo tumido, apice obtuso, latiore, setis parvis paucis instructo. *Mandibulæ* crassæ, subquadratæ, apice internè bidentatæ, externè ciliatæ.

Thorax capite duplò longior, paulò latior; compactus, gibbus; metathorace utrinque profundè excavato, spiraculâ sat conspicuâ, posticè truncato, appendiculato. *Alæ* nullæ.

Pedes antici robusti; femoribus crassissimis; tibiis brevibus, apice valdè dilatatis, angulis semicirculariter productis, acutis; tarsis brevissimis, 2-articulatis; articulo 1mo parvo, basi elongato, constricto, apice dilatato; 2do maximo, inflato, ferè ut quatuor in uno conjunctis, unguiculis magnis. *Pedes* intermedii tenuissimi, lineares; tarsis elongatulis,

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* Femina (secundum Gravenhorstii diagnosin). Color nigroæneus, nitidissimus; fossa capitis rufa; ore ferrugineo; antennis fuscis (12-articulatis), articulis duobus primis rufo-ferrugineis, 4to introrsum spina apicali porrecta; pedibus piceis, femoribus plus minus fuscescentibus, coxis et trochanteribus fuscis; terebra rufa (cæteris omissis).

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5-articulatis, unguiculis tenellis. *Pedes* postici robusti; femoribus ut in anticis valdè incrassatis; tibiis brevibus, excurvis, apice dilatatis, angulo externo biuncinnato; tarsis 5-articulatis, articulis mediocribus, basali et extimo longioribus, unguiculis validis.

Abdomen elongatum, subter thorace plicatile; basi thoracis latitudine, medio latius; segmentis 7; basalibus 4 valdè inflatis, sensim deflexis; reliquis tubulum tenue, rectum, compressum, apice obtusum, constituentibus, intra quod genitalibus retractilibus.

Hab.—Europâ meridionali, in Ficus Caricæ grossis.

Gravenhorst considered the females of his *B. grossorum* to correspond with Pontedera's unnamed species (Anth. lib. 2, p. 172, tab. xi.); but certainly not coinciding with either the *Cynips Ficus* or the *C. Caricæ* of Hasselquist, which he thought distinct *inter se*. Pontedera speaks of finding both sexes of his species; defining the females as having an exserted ovipositor; whence his figures, as wanting this organ, have been supposed to represent the males; but he appears to have mistaken mutilated females, reft of their oviduct, for the other sex.

Gravenhorst has not described the mouth-parts in the female of *B. grossorum*, as not distinctly visible; with the exception of the outlying appendages, which he supposed to be *palpi*, but which Professor Westwood, in treating of *B. Sycomori*, ♀, has shown to be affixed to the *base of the mandibles*. In the Montpellier specimens the manducatory organs of the female agree with those of *B. Sycomori*; the *mandibles* being subquadrate and bidentate at the apex (like those of the male), externally ciliated, and furnished at the base, towards the inner angle, with an elongate, corneous, exarticulate, compressed spatula, transversely 5- to 7-serrated, projecting obliquely backwards under the head, gradually increasing in width and terminating in a broad rounded apex.

These remarkable appendages, nearly as wide as the mandibles themselves to which they are firmly attached, and more elongate, may possibly serve to relieve the latter by facilitating their opening when clogged with the viscous juices of the fig; the sharp transverse serratures in these spatulæ—obliquely inclined—with the interstices sloping towards the thorax, affording a ready means of propelling the same, and, with them, the inner region of the mandibles, by the action of the dilated anterior tibiæ.

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XXIX. *Descriptions of new species of* Hemiptera-Homoptera. By W. L. Distant.

[Read November 6th, 1878.]

My friend, Mr. F. Moore, having submitted his fine collection of Indian *Homoptera* to me for identification, I found, in addition to many rare insects, the three following new species of *Cercopidæ*. I have also added diagnoses of some other undescribed Homopterous forms from the collections of Mr. F. J. Horniman and my own.

Fam. CERCOPIDÆ.

Genus Cosmoscarta, Stål.

Cosmoscarta borealis, n. sp.

Pilose. Head and pronotum luteous; antennæ black; abdomen and tegmina roseate; ocelli black, placed much nearer to each other than they are from eyes. Face tumid, much compressed, transversely strigose, and deeply and broadly sulcated in front. Eyes prominent, luteous, thickly covered with irregular blackish markings. Pronotum deflexed towards head, on which portion is a raised central longitudinal line, and an irregular fovea behind eyes (much more distinct in some specimens than in others); wings pale fuscous. Pectus, coxæ and femora luteous, fore and intermediate tibiæ black, hind tibiæ luteous with apex black. Apex of rostrum, tarsi and strong, spine near apex of posterior, tibiæ black.

Long. ex. tegm. 6 mill.; exp. tegm. 17 mill.

Khasia Hills; W. Yunnan. Coll. Moore; Distant.

Allied to the Bornean species *C. semirosea*, Walk., from which, in addition to other characters, it can be at once distinguished by the colour of the pronotum and fore and intermediate tibiæ.

Cosmoscarta Moorei, n. sp.

Black, shining, irregularly pilose. Tegmina thickly and finely punctured, with the base, *both above and below*, carmine. This coloration consists of a narrow straight subcostal streak of about 3 mill. in length, and a broader

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claval streak of about the same length, gradually rounded and narrowed at its termination. Wings fuscous, costal edge for about half the length narrowly tinged with carmine. Face transversely wrinkled and with a distinct central longitudinal impression. Eyes luteous. Pronotum with a distinct central longitudinal ridge from its anterior border to disc. Posterior borders of scutellum, metanotum and abdominal segments; apex and lateral borders of abdomen carmine. Anterior legs dull reddish, femora armed with a strong spine. Intermediate legs pitchy, posterior legs mutilated. Mesosternum armed with two very large, thick, conical teeth.

Long. ex. tegm. 13 mill.; exp. tegm. 35 mill.

Sikkim. Coll. Moore.

Allied in appearance to *C. Charon*, White, from which it principally differs by the narrower tegmina and the red basal patch to same; the wings in *C. Charon* are also almost black.

Genus PHYMATOSTETHA, Stål.

Phymatostetha insignis, n. sp.

Head, pronotum, scutellum and base of tegmina (extending as far as apex of scutellum) sanguineous, remainder of tegmina black clothed with white pile. A black point in each lateral angle of the pronotum and two central parallel somewhat indistinct lines of the same colour, extending from base to about the disc. Fore femora and tibiæ sanguineous, tarsi pitchy.

Long. with tegm. 7 mill.

Ceylon. Coll. Moore.

Owing to the type being carded in an unexpanded state, it is impossible to give more than the above general outline in delineation of this small but striking species.

Phymatostetha binotata, n. sp.

Piceous. Head, face, lateral edges of pronotum, borders of tegmina and two rounded spots on same (one placed a little above claval suture about one-third from base, and the other midway about one-third from apex), pale sanguineous. Scutellum black, narrowly bordered with red. Abdomen above, shining, purplish-black. Eyes, legs and under side of body black. Legs pilose, femora somewhat castaneous. Wings fuscescent, bases narrowly san-

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guineous. Hind tibiæ armed with two strong spines, one near base small, other about middle strong, robust. Face faintly and transversely strigose. Pronotum rugulose, with a faint central longitudinal ridge.

Long. ex. tegm. 14 mill.; exp. tegm. 35 mill.

Sadia, North of Brahmaputra, 350 ft. (Chennell). Coll. Distant.

The nearest allied species is *Phy. triseriata*, Butl., from which it differs by the much narrower tegmina as well as the different pattern of same.

Fam. FULGORIDÆ.

Genus APHANA, Guérin, Burm.

Aphana novemmaculata, n. sp.

Head, pronotum and mesonotum dull reddish; eyes luteous. Pronotum, with four spots on anterior border and the same number on anterior border of mesonotum and one on its apex, black. Metanotum and abdomen above black, the last with the apex broadly luteous. Tegmina, with almost two-thirds of basal portion, dull reddish, remainder luteous; nervures and costal border green. Two somewhat indistinct transverse whitish bands, one near base and the other near extremity of the dark portion of tegmina. Wings with apical third luteous, remainder bright red, on which are some irregular black spots. Face, rostrum, sternum and legs dull reddish, apex of rostrum and tarsi black, the posterior tarsi reddish at base. Posterior tibiæ armed with strong spines. Under side of abdomen dull luteous. A somewhat rectangular hollowed space between eyes. Pronotum and mesonotum transversely rugulose.

Long. ex. tegm. 13 to 14 mill.; exp. tegm. 43 to 47 mill.

Mongo-ma-lobah, W. Africa. Coll. Horniman; Distant.

Genus POLYDICTYA, Guérin.

Polydictya maculata, n. sp.

Head, face, rostrum, pronotum and scutellum luteous, the last with a few pitchy markings. Tegmina black, with a basal patch, a short subcostal streak, and a number of irregular spots (mostly situated on basal third of tegmina, but a few extending to commencement of apical third) luteous—these spots are inconstant in number and

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size—nervures reticulated, those of apical third brownish. Wings hyaline, with the nervures black and the inner and outer margins broadly of the same colour, much more widely so at apex, and rather paler on inner margin. Abdomen above reddish, with the basal third black. Under side of body luteous: abdomen with dull reddish shadings and two large obsolete black spots on apical segment. Anterior and intermediate legs black, with bases of femora luteous; hind coxæ and femora luteous, the last with a black subapical band, and the apex, tibiæ and tarsi reddish.

The pronotum has two foveæ on disc, separated by a raised central longitudinal line; the tegmina and wings have the nervures very closely reticulated, very indistinctly, however, on the central hyaline portion of the wings; the abdomen has a central longitudinal keel; rostrum reaching a little beyond posterior coxæ; legs somewhat pilose; hind tibiæ armed with a marginal row of five spines, of which the basal two are small and obscure.

Long. ex. tegm. 20 mill.; exp. tegm. 49 mill.

Isubu, Mongo-ma-lobah, W. Africa. Coll. Horniman; Distant.

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XXX. *Descriptions of new* Telephoridæ *from Central and South America.* By Chas. O. Waterhouse.

[Read November 6th, 1878.]

In an interesting collection of *Coleoptera*, recently received by the British Museum from Medellin, in Columbia, is a species of *Telephoridæ*, belonging to the genus *Chauliognathus*; and while ascertaining whether it had been yet described, I found in the collection several interesting species hitherto unnoticed, and which I, therefore, here characterize. The new species are:—

Chauliognathus Haversii, n. sp.	Chauliognathus janus, n. sp.
„ sodalis, n. sp.	„ dimidiatus, n. sp.
„ togatus, n. sp.	„ pallidus, n. sp.
„ excellens, n. sp.	„ sulphureus, n. sp.
„ distinguendus, n. sp.	Xenismus (gen. n.) nigroplagiatus, n. sp.
„ expansus, n. sp.	

Chauliognathus Haversii, sp. n.

Niger, opacus; thorace ochraceo, guttâ mediana nigrâ notato; elytris medio fasciâ fere albâ ornatatis; abdominis segmentis flavo-marginatis.

Long. 5 lin.

Antennæ moderately stout. Thorax reddish-yellow, scarcely as broad as long, quadrangular, rather flat, the margins narrowly reflexed, the front margin arcuate, the sides nearly straight, all the angles rounded, disk with a black spot in the middle. Elytra at the base rather broader than the thorax, a little broader below the shoulders and then much narrowed to the apices which are separately rounded, dull black, finely rugulose, with a pale yellow slightly undulating fascia across the middle not quite touching the margins.

Hab.—Uruguay (Thos. Havers, Esq.).

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Chauliognathus sodalis, sp. n.

Niger, opacus, brevissime pubescens; thorace lateribus elytrisque ochraceis; ano rufo. ♂, ♀.

Long. 8—10 lin.

Var. 1. Elytris apice late nigris.

Var. 2. Elytris plagâ scutellari triangulari apiceque late nigris.

Head rather long, shining in front, not very much narrowed posteriorly. Thorax one quarter broader than long, a little narrowed in front, with the lateral margins strongly reflexed, all the angles much rounded, the anterior margin and the sides arcuate, black with the sides yellow. Elytra yellow, with a trace of black at the scutellum, nearly parallel. Antennæ very stout and compressed.

Var. 1. Elytra with the apical third black, and not quite so parallel as in those with unicolorous elytra. ♂, ♀.

Var. 2. Elytra with a large triangular scutellar patch and the apical third black. ♀.

Hab.—Oaxaca, S. Mexico.

In the Museum collection there are four specimens of an insect which I believe to be *Telephorus adultus*, Castelnau (N. Hist. Anim. Art. I. p. 271), which nearly agree with variety 2 in coloration, but differ in having the antennæ shorter and very slender; the abdominal segments are bordered with yellow, and the elytra are not pubescent but strongly and closely punctured.

Chauliognathus heros, Guérin, var.

Elongatus, niger, opacus; thorace flavo, medio guttâ nigrâ notato; abdomine ferrugineo, segmentis 1° et 2° ad latera guttâ nigrâ notatis, segmentis 3° et 4° nigris.

Long. 10 lin.

This variety differs from the ordinary form of *C. heros*, Guérin (Rév. Zool. 1843, p. 18), in having the elytra entirely black instead of yellow at the base.

A second specimen of the ordinary form received with the above has the abdomen ferruginous, with four black spots on each side.

Hab.—Ecuador (Buckley).

Chauliognathus togatus, sp. n.

Elongatus, parallelus, niger, opacus; thorace rufo ma-

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culâ medianâ nigrâ; elytris rufis apicem versus paulo angustatis, abdomine rufo.

Long. 10 lin.

Var.—Elytris basi fasciâ angustâ utrinque abbreviatâ et post medium fasciâ rectâ nigris.

Long. 11 lin.

Head not very long; the sides are nearly parallel immediately in front of the eyes and then obliquely converge; the neck is obliquely and not very much narrowed posteriorly; densely pubescent. The antennæ are more or less ferruginous below. Thorax one quarter broader than long, a little narrowed in front, strongly reflexed at the sides, the angles and the sides rounded, especially the posterior angles, red, with a black spot in the middle, which is sometimes transverse. Elytra scarcely broader than the thorax, flat, straight at the sides, a trifle narrower at the apex than at the base, dull red, pubescent. Abdomen red.

A variety has a narrow, transverse scutellar spot, and a straight fascia, rather behind the middle of the elytra, black.

Hab.—Oaxaca, S. Mexico.

Chauliognathus excellens, sp. n.

Niger, supra sat nitidus subtus opacus; thorace ochraceo, nitidissimo, impunctato, lateribus late reflexis; elytris purpureo-nigris, nitidis subtilissime coriaceis et brevissime pubescentibus; abdomine ferrugineo.

Long. 14 lin.

Head long, muzzle broadest at the first third of its length, then obliquely narrowed anteriorly and truncate at the apex, with a few extremely fine punctures; the neck very slightly narrowed posteriorly. Thorax one third broader than long, with an impressed line within the posterior margin. Elytra at the base a little broader than the thorax, rather widened below the shoulders, purplish-black, extremely finely coriaceous, with very short pubescence.

Hab.—Medellin.

Chauliognathus tripartitus, Chevr., var.

Niger, nitidus; elytris flavis maculâ magnâ communi

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ante apicem nigrâ; abdomine flavo nigro-guttato; tibiis posticis basi flavescentibus.

Long. 6½ lin.

This variety differs from the Mexican examples of *tripartitus* in having a large black spot or transverse band a little before the apex of the elytra, instead of having the whole apical half of them black.

Hab.—Guatemala.

Chauliognathus distinguendus, sp. n.

Niger, subopacus; thorace flavo, medio nigro; elytris flavis, maculâ scutellari, plagâque subapicali nigris.

Long. 7 lin.

Head not very long, obliquely narrowed behind the eyes, oblique narrowed in front of the antennæ; mandibles yellow on their outer margin. Thorax yellow, opaque and black on the disk, reflexed at the sides, the anterior angles rounded, the sides scarcely arcuate, the posterior angles distinct, but very obtuse, the base oblique on each side, gently emarginate in the middle. Elytra yellow, scarcely as broad as the thorax at the base, a little broader in the middle, narrower at the apex, each elytron with a black spot at the scutellum, and a large subapical triangular black patch, which nearly unites with the corresponding spot on the other elytron.

Hab.—Guatemala.

Var. Each elytron with a round black subapical spot close to the suture.

Chauliognathus distinguendus, var. ?

Niger, subopacus, pubescens; thorace flavo, guttis quatuor nigris; elytris flavis, basi maculisque duabus rotundatis post medium nigris; abdominis segmentis anguste flavo-marginatis.

Long. 8 lin.

Head not very long, narrowed in front of the antennæ, obliquely narrowed behind the eyes. Thorax yellow, one quarter broader than long, rather strongly reflexed at the sides, anterior angles much rounded, the front and sides gently arcuate, the base oblique on each side, emarginate in the middle. Elytra at the base a little broader than the thorax, a little broader in the middle, narrower again at the apex, yellow, dull, finely pubescent, the base black;

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and on each elytron there is a round black spot close to the suture, rather behind the middle. The segments of the abdomen are narrowly bordered with yellow.

Hab.—Oaxaca, S. Mexico.

This may prove to be a distinct species from *C. distinguendus*, as the head appears rather longer.

Chauliognathus axillaris, Fischer.

I have just made a careful examination of the type specimen of *Cantharis flavipes*, Fabr. (Spec. Ins. 1781, I. p. 259), in the Banksian collection at the British Museum, and said to come from China. I find it to be identical with a common Brazilian *Chauliognathus*, a dark form of that described by Fischer (Mem. Mosc. 1823, VI. p. 254), as *Telephorus axillaris*.

The following remarkable species is allied to the foregoing:—

Chauliognathus expansus, sp. n.

Fusco-niger; capite opaco, clypeo ochraceo notato; thorace opaco, longitudine $\frac{2}{3}$ latiori, anguste flavo-cincto, lateribus leviter rotundatis parum reflexis; elytris basi thorace paulo angustioribus, medio duplo latioribus dein ad apicem angustatis, depressis, flavis, dimidio apicali fusco-nigro, marginibus angustissime flavis, apice ipso flavo acute dentiformi, lateribus medio plagâ sub-vitreâ notatis; coxis, femoribus tibiisque posticis ochraceis, nigronotatis.

Long. 7 lin.; lat. elytr. med. $4\frac{1}{4}$ lin.

This species is remarkable on account of the flat lozenge-shaped elytra, which are in the middle rather more than twice as broad as at the base, and on account of the semi-transparent patch on the lateral margin, their surface is rather closely punctured, and towards the apex are some minute tubercles intermixed; the pitchy-black patch occupying the apical half of the elytra leaves the extreme margins and apex yellow and emits a slender branch which runs along the side, between the vitreous spot and the margin. Each elytron terminates in an acute spur.

Hab.—Brazil.

Chauliognathus janus.

Niger; antennis sat brevibus tenuibus, apicem versus rufescentibus; thorace amplo, nitido; elytris medio paulo

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ampliatis, nigris vel fasciâ rectâ ante medium, apiceque extremo flavis; tibiis posterioribus basi piceis; abdomine flavo, ad lateras nigro-guttato.

Long. 8½ lin.

Allied to *C. flavipes*, Fabr. Head and thorax very shining. Thorax one third broader than long, a little narrowed in front, the angles obtuse, the sides very slightly arcuate, reflexed. Elytra at the base scarcely as broad as the thorax, considerably widened a little behind the middle, punctured at the base, dull and closely rugose behind, with a well-defined yellow fascia before the middle; the extreme apex is also yellow.

Hab.—Ecuador (Buckley).

In a second example the yellow band of the elytra is wanting, but there are two minute yellow dots on the left elytron where the band would be.

Chauliognathus dimidiatus, sp. n.

Elongatus, angustus, niger, opacus; thorace quadrato, elytrisque dimidio basali rufo-ochraceis; corporis subtus segmentis pallide flavo-cinctis, ano flavo. ♂, ♀.

Long. 7—8 lin.

Head very long; antennæ long and very slender. Thorax a trifle broader than long, quadrangular, scarcely narrower at the base, reddish-yellow, dull, the front and lateral margins gently reflexed, the anterior angles much rounded, the sides rather straight, posterior angles rather obtuse. Elytra long, parallel, a very little narrowed at their apices, densely and finely rugulose, with the basal half reddish-yellow.

The male has the greater part of the sternum and the margins of the abdominal segments pale yellow.

The female has less yellow beneath.

Hab.—Mexico.

Chauliognathus pallidus, sp. n.

Elongatus, gracilis, testaceus, opacus; antennis, tibiis tarsisque fuscescentibus, femoribus piceo-flavis. ♂.

Long. 5 lin.

Head shining, rather long, eyes very prominent, the forehead with a longitudinal impression between the antennæ. Antennæ very long and slender, fuscous. Thorax quadrate, rather flat but uneven above, not quite as broad

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as the head across the eyes, very nearly as broad as long, the anterior angles rounded, the sides nearly straight, incrassate but not reflexed, the posterior angles distinct. Elytra a little broader than the thorax, a trifle narrower at the apex, finely coriaceous, sparingly pubescent, visibly punctured towards the apex. Legs long and slender, the femora obscure yellow, the tibiæ and tarsi dusky.

Hab.—Mexico.

Var.—Legs uniform yellowish.

Chauliognathus sulphureus, sp. n.

Elongatus, gracilis, flavescens; capite, thorace, antennis pedibusque fuscis; elytris sulphureis, apicem versus angustatis. ♀.

Long. 7½ lin.

Closely allied to the preceding, but besides the difference of coloration, the thorax is a little less narrow, as broad as long, with the sides distinctly but not broadly reflexed; the elytra are more densely clothed with fine pubescence, narrowed towards the apex, finely coriaceous, with no visible punctuation towards the apex, as in the foregoing species. The legs are very long and slender, fuscous, with the coxæ and base of the femora yellow.

Hab.—Nauta, Amazons (Bates).

XENISMUS, gen. n.

Characters of *Telephorus*, but with the head evenly convex above, and with a distinct well-defined transverse labrum, which is about four times as broad as long, separated from the epistoma by a curved line, the anterior border parallel to the posterior.

I have not been able to find any Telephorid, nor, indeed, any Malacoderm, with the peculiarity presented by the part which I have above alluded to as the labrum, and I am in doubt as to whether this part should be termed the labrum or clypeus. The solidity of its texture, and its close contact at the ends with the cheeks, incline me to consider it the clypeus (in which case the labrum would be so reduced as to be invisible), but the presence of a distinct clypeus is also foreign to the *Telephoridæ*, with which the species must, however, undoubtedly be associated.

Xenismus nigroplagiatus.

Flavus, nitidus; elytris fortiter (apicem versus subtilius)

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rugosis, fimidio basali, lateribus cuclusis nigro; pectore griseo-nigro.

Long. 1½ in.

Head rather short and large, very little narrowed behind the eyes (which are black), gently convex, extremely polished, not impressed between the antennæ: the maxillæ and the tip of the mandibles black. Antennæ slender and not very long. Thorax as broad as the head across the eyes, one quarter broader than long, extremely polished, not narrowed posteriorly, the anterior margin and the sides (which are gently reflexed) nearly straight, the posterior margin very slightly emarginate in the middle, all the angles equally rounded. Elytra at the base scarcely broader than the thorax, distinctly broader at the posterior two-thirds, narrowed at the apices, yellow, with a black patch extending from the base to the middle but leaving the sides yellow, the black portion is shining and very rugosely, almost reticulate-punctate, the yellow portions are closely and strongly punctured and slightly pubescent. The coxæ and the metasternum are blackish.

Hab.—Ecuador (Buckley).

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XXXI. *The prevention of Insect injury by the use of Phenol preparations.* By ELEANOR A. ORMEROD, F.M.S.

[Read November 6th, 1878.]

I FEEL some hesitation in venturing to withdraw your attention for a short time from more scientific matters to that of the *Psila rosæ*, too well known for the injury it causes in our carrot crops, under the name of "rust;" but after noting for many years the means generally used, and, ordinarily, with little success for keeping it in check, I have this year been fortunate enough to stop its ravages so completely that, perhaps, I may be allowed to say a few words on the subject, looking on it as the type of a class of injurious insects very difficult to deal with practically,—whose life, in all but the imago state, being carried on beneath the surface of the earth, show their presence only by its results when it is often too late to apply a remedy, and, generally speaking, difficult to find an application that will destroy the insect without injuring the plant.

On the 19th of June I found the carrots in my garden perishing under the worst attack of *Psila rosæ* that I ever met with. Instead of being simply limited to a number of larval borings towards the extremity of the root, the plants were in some cases killed, in others were destroyed fully half-way up; the larvæ were unusually fine and numerous, and the constantly-increasing injury to the plot might be traced by the daily-altering state of the plants, which were given up as hopeless by the various gardeners I consulted.

It occurred to me that a fluid application I was then experimenting with, known as "Little's Soluble Phenyle," of which the ingredients were stated to be a distillation of tar, similar to creosote, and pine oil, and which I had found injurious to insect life, whilst beneficial to vegetation, might be of service, and after watering the plants for a few days with it in a dilute state, the application took effect thoroughly.

In less than a fortnight the attack had ceased spreading, and some of the infested plants showed signs of recovery;

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in another week healthy foliage was showing, contrasting with the dull orange-coloured leaves characteristic of the insect attack to the root, and from that time till the 12th of August, when they were raised for examination, surprising root and leaf together for comparison, they continued to grow luxuriantly with no return of attack of the "rust" fly.

Taking the roots in the mass, they showed how sudden the check had been to the insect life. Where the grubs had died from the application of the phenyle, whilst there was just sufficient life left in the root to recover, though it was truncated by the loss of the insect-injured portion, it had grown in width, and might be seen as sketched at fig. 1, sometimes with a morsel of the gnawed extremity still attached.

Those that had sprung from seed (even in the very centre of the most infested part) after the application of the "soluble phenyle" were absolutely untouched by the larvæ, and healthy, as also those that had been preserved similarly from attack, and the only notable presence of "rust" was in a root so far from the experimental application as probably to have escaped the remedy, and the foliage was so exceedingly luxuriant, and clear brilliant green, that the experiment was stated to be quite satisfactory by the gardeners I asked to examine it, not wishing to trust my own opinion.

I should feel little doubt for the future of checking the attack of the rust insect by a timely application, but from some experiments carried on by leaving pupæ of *Otiorhynchus sulcatus* in soil soaked with the "soluble phenyle" (little, if at all, diluted), and by which they were only exceptionally injured, it appeared that the larvæ were got rid of either by starvation or the unwholesome state of their food when saturated with the chemical fluid, not by external application; and the question arose, whether phenol compounds present in sufficient quantity to destroy insect life might be objectionable in food roots.

I had, therefore, a proper analysis made of some of the roots, and it appeared by fractional distillation with water that a minute quantity of a tarry volatile substance was separated, this being possibly carbolic acid or a homologue of that substance, the quantity obtained being too small for more precise examination.

The pectin and sugar were stated to be unaltered, and the ash showed nothing beyond what usually exists.

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The results showed that the absorbed substance or substances were so small in quantity that, though (in the most extreme cases) perceptible to taste and smell before cooking, the quantity, even in these instances, was not sufficient to make the roots prejudicial to the health; and with regard to the taste, I may mention some cabbages similarly treated, and given to my gardener and his wife for special observation, were pronounced everything that could be wished.

I cannot help feeling a hope that this experiment may be followed up into something of general utility.

In all cases I have found the "soluble phenyle" beneficial to vegetation; and, looking at the degree to which larval health is affected in many cases merely by the difference in the watery or condensed state of the sap, and the general refusal of larvæ to feed at all unless the food is to their taste, it appears that a fluid so thoroughly distasteful as this—not simply soddening from the outside but circulated by the vegetative action exactly in the young and growing tissues most liable to insect attack—might be of much service at hardly appreciable cost, except the wages of a labourer for occasional application, and might even be brought to bear on the *Phylloxera*.

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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON

FOR

1878.

February 6, 1878.

H. W. Bates, F.L.S., F.Z.S., President, in the chair.

The President nominated Prof. J. O. Westwood, Mr. J. W. Douglas and Mr. Frederick Smith as Vice-Presidents.

Donations to the Library were announced, and thanks voted to the donors.

Election of Members.

Mr. Richard S. Standon, of Holmwood Lodge, Surbiton, and Mr. T. W. Wonfor, of 38, Buckingham Place, Brighton, were ballotted for and elected Members.

Exhibitions, &c.

Mr. Jenner Weir exhibited three specimens of an *Atypus* taken on a bank near Lewes; they were stated to erect a pile of small pieces of chalk in front of their burrows. Mr. Weir also exhibited a remarkable spider from Madagascar, and a small living spider (*Philodromus*), marked and coloured in imitation of lichen, which he had beaten out of trees in the New Forest.

Sir Sidney Saunders stated that the *Atypus* was *A. Sulzeri*, Koch.

Mr. M'Lachlan exhibited a small collection of dragon-flies of the genus *Euthore*, in illustration of a paper entitled "*Calopterygina* collected by Mr. Buckley in Ecuador and Bolivia." The collection contained a fine series of both sexes of a new species, *Euthore mirabilis*.

Mr. Meldola exhibited a remarkable specimen of *Leucania conigera* taken at Willesden. The colour and markings of the fore wings were reproduced on the lower half of the left hind wing.

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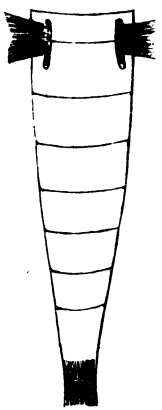
Mr. Meldola then read the following extracts from a letter from Dr. Fritz Müller to Mr. Charles Darwin, dated from Santa Caterina, Brazil, 27th November, 1877:—

"My children lately caught on the flowers of *Calonyction* (sp.?) a Sphinx-moth, the proboscis of which is 22 centimetres long. As I think that you would be glad to see this curious proboscis I send it to you. * * * * During the month of October I have watched for some weeks the butterflies visiting a *Lantana* near my house, the flowers of which are yellow the first day, orange the second, purple the third day, and falling off on the morning of the fourth. Eight out of eleven species of butterflies (*Heliconius apseudes, Colænis Dido, C. Julia, Dione Juno, Hesperocharis Anguitia, Eurema Leuce, Daptonoura Lycimnia*, and *Callidryas Cipris*) never touched an orange or purple flower, limiting their visits exclusively to the yellow ones. Two specimens of *Pieris Aripa* (or *Elodia*?) proceeded in the same way, whilst a third specimen of this *Pieris* inserted its proboscis indifferently into yellow or orange flowers. Three specimens of *Danais Erippus* evidently preferred yellow flowers, but sometimes also tried orange flowers, and one of them even once put its proboscis into a purple flower; a fourth specimen of *Danais* visited yellow flowers only. Lastly, I saw three specimens of *Hesperidæ*, but as I did not catch them, and as the species most closely resemble each other, I do not know whether they belonged to the same species; two visited exclusively yellow flowers, the third indifferently flowers of any colour—yellow, orange, or purple. These observations, of which a full account will be published in the 'Archivos do Museo Nacional do Rio de Janeiro,' confirm those by Delpino on *Ribes aureum* and *Caragana arborescens*. If the flowers lasted but one day the flower-heads would be by far less conspicuous; if they lasted three days without changing colour, butterflies would lose much time in visiting honeyless, already-fertilized flowers. * * * Yesterday I caught, for the first time, the male of a Sphinx-moth which exhaled a strong musk-like odour; as you know, this is also the case with the males of the European *S. convolvuli* and *S. ligustri;* but nobody has as yet, so far as I know, indicated the odoriferous organ. It is formed by two pencils of hairs situated on the ventral side of the base of the abdomen, and when at rest are perfectly hidden by the scales (hairs?).



Scent-fans of Sphinx-moth.

"I do not remember whether I have already called your attention to an interesting secondary sexual character observable in several species of *Callidryas* and some other *Pierinæ*. The costal margin of the anterior wing is sharply serrated in the males, while it is smooth in the females. In *Callidryas Philea* some females have the wings smooth, others serrated, but

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in a far less degree than in the male. This may be a sort of weapon in the battles of the males. Whether in *Papilio Grayi*, *P. Cleotas*, *P. Coræbus*, and their allies, the serrated margin of the fore wings is limited to the male sex I do not know, not having yet caught females of these rare species."

Mr. Meldola exhibited the proboscis of the *Sphinx* referred to in the above letter, and also the wings of a male specimen of *Callidryas Argante*, showing the serrated margin. He remarked that he was indebted to Mr. Darwin for having kindly placed the letter and specimens at his disposal. With reference to the length of proboscis of Sphinx-moths, it was stated that in the British Museum there is a South-American specimen of *Macrosila cluentius*, the proboscis of which is 23·5 centimetres (= 9¼ inches) long. Both Mr. Darwin ('Fertilization of Orchids,' 1862, p. 198) and Mr. Wallace ('Quarterly Journal of Science,' Oct. 1867) had predicted the existence in Madagascar of a moth with a proboscis sufficiently long to reach into the nectar of *Anagræcum sesquipedale*, the nectary of which orchid is from ten to fourteen inches in length. This prediction, although not at present specially fulfilled with regard to Madagascar, has been since shown to have a great amount of probability by the discovery of a *Sphinx* in South America with a proboscis 25 centimetres (= 9·8 inches) in length. This specimen was also captured by Fritz Müller (see 'Nature,' vol. viii., p. 223), and has been since identified as *Macrosila cluentius* (see 'Nature,' vol. xvii., p. 221). The selective discrimination of flowers of certain colours referred to in the foregoing letter appears to afford additional proof of the fact that insects can distinguish colours—a fact of the utmost importance to the theory of Sexua Selection. With reference to the serrated costal margin of the fore wings of butterflies, Mr. Meldola stated that this character had been shown to exist in the genus *Prioneris* by Mr. Wallace (Trans. Ent. Soc., ser. iii., vol. iv.), and in the genera *Amynthia* and *Pyrrhosticta* by Mr. A. G. Butler, but that, so far as he knew, it was now made known in *Callidryas* for the first time.

Mr. A. G. Butler stated that in many of the exotic *Notodontidæ* he had observed a fan-like tuft in the males. With reference to the *Sphingidæ* of Madagascar, he stated that he had measured the probosces of all the specimens in the British Museum, and none of them exceeded five inches in length. Mr. Butler further remarked that the whole of the Old World species of butterflies separated under the Hübnerian genus *Catopsilia*, the whole of the New World species separated under the genus *Phœbis* of Hübner, all the species of the true *Callidryas*, Boisd., and one species only of the genus *Aphrissa*, Butler, have the serrated costa in the male sex. *Aphrissa Godartiana*, Swainson, although closely allied to *A. Hartonia*, Butler, being similar in colour and pattern, but differing chiefly in size and the shortness of the wings, has a strongly serrated costa, whilst *A. Hartonia* has the costa smooth. With regard to the object of the serrated margin,

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Mr. Butler stated that he was disposed to accept Fritz Müller's explanation that it may be of use in the battles of the males.

Mr. Bates remarked that in *Prioneris* the serrated costal margin exists in both sexes.

The Secretary called the attention of the members to the approaching International Entomological Exhibition to be held at the Royal Westminster Aquarium in March. He also exhibited, on behalf of Capt. Elwes (who was present as a visitor), a series of coloured illustrations of butterflies, printed from nature by a new process invented by Dr. Sériziat, of Collioure (Pyrénées Orientales), France. The inventor states that the "colouring matter is fixed by means of a special adhesive and a press; the bodies are painted in water-colours after nature."

Mr. G. C. Champion exhibited twelve species of the genus *Cetonia*, taken by Mr. J. J. Walker, of H.M.S. 'Swiftsure,' at Besika Bay, Salonica, Piræus, and other Mediterranean localities. He also exhibited a specimen of *Anthicus bimaculatus*, a rare British beetle, taken near New Brighton by Mr. J. T. Harris, of Burton-on-Trent.

Mr. J. W. May exhibited a specimen of *Carabus intricatus* taken at Fulham.

Mr. H. Goss called attention to the occurrence of sexual dimorphism in *Erebia Medea*, and exhibited specimens of both forms of the female. He stated that he had obtained specimens of both forms nearly every year for the last sixteen years from Silverdale, Lancashire, and that one form was quite as common as the other. The principal difference between the two forms consisted in the colouring of the discal band. In one form, which Mr. Goss believed to be the typical form, the discal band was bluish ash-colour, and in the second or diverging form it was ochreous-brown, or in some specimens whitish ochreous.

Papers read.

Sir John Lubbock read a paper "On the Colouring of British Caterpillars." Starting from the principles laid down by Darwin, Wallace, and others, that dull-coloured, green, and smooth-skinned caterpillars are eaten by birds, &c., while spiny, hairy, and brightly-coloured species are rejected, the author proceeded to show by a statistical method of tabulation that no hairy caterpillars are green, while, on the other hand, a large majority of black and brightly-coloured caterpillars are hairy.

Mr. Jenner Weir expressed his warm approval of the method by which Sir John Lubbock had treated the subject, and remarked that the results obtained forcibly illustrated the antagonism between green coloration and hairy protection. He further stated that during the past summer he had seen the larvæ of *Euchelia Jacobeæ* in great profusion on *Senecio*, which plant had been completely stripped of its leaves over a large area of the

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New Forest. This great abundance of the caterpillar he regarded as a natural experiment on a large scale illustrating the truth of the doctrine advocated.

Mr. J. W. Douglas asked whether the bright colours of the caterpillars actually frightened away birds. He remarked that it was well known that the Shrikes impaled brightly-coloured and hairy insects, such as bees.

Sir John Lubbock stated that the bright coloration or hairy covering of a caterpillar acted simply as a warning that the species was inedible. It was clearly an advantage to a distasteful species to be recognized as such before being pecked at by a bird, and not after being seized, in which case the larva, although perhaps not killed at the time, would in all probability ultimately die of the wounds inflicted. Thus by the action of Natural Selection had bright colours and hairs become associated with distasteful qualities.

Mr. M'Lachlan stated that in 1865 (Trans. Ent. Soc., ser. 3, vol. ii.) he had called attention to the fact that some flower-frequenting caterpillars were of the same colours as the flowers on which they fed. He remarked that this was especially the case with the genus *Eupithecia*. Mr. M'Lachlan also called attention to the fact that the larvæ of many *Sphingidæ*, such as *Acherontia Atropos* were known to present two distinct forms or coloured varieties.

Mr. Butler remarked that he could fully endorse Sir John Lubbock's view of the function of the oblique stripes on the sides of *Sphinx* larvæ—that these markings were intended to represent the shadow-lines cast by leaves. He mentioned that he had recently had an opportunity of observing *Sphinx ligustri* under conditions most favourable to this deception. Mr. Butler further remarked that many of the exotic larvæ belonging to the genera *Sphinx* and *Smerinthus* were dimorphic. With reference to colour being influenced by food-plant, he stated that he had observed this fact in connection with species of *Mamestra*.

Sir John Lubbock stated, with regard to dimorphic larvæ, that Weismann had shown that in such cases one form generally retained the characters of the young larva, while the other form diverged from it at a certain stage of growth. The dark-coloured varieties generally existed in those species which fed on low-growing plants, under which conditions the dark colour served as a protection to the caterpillar when hiding by day.

Mr. H. Goss said that he had long been familiar with two forms of the larva of *Chærocampa elpenor*, and that the green and brown varieties were about equally common, the former colour not being in any way confined to young larvæ.

Mr. J. P. Mansel Weale remarked that in South Africa the ordinary form of larva of *Acherontia Atropos* feeds generally upon *Solanaceæ*, while the dark form, which is rarer, he had found only on species of *Lantana*.

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The larva of *Chærocampa capensis* feeds on the wild vine, and is green, shaded with oblique stripes of pale violet; it has two eye-like spots on the thoracic segment, but they are very small, and would in this case hardly be serviceable to the insect in frightening away birds; the general coloration of the caterpillar is probably protective. Another *Chærocampa* larva feeding on the wild vine is dark-coloured, but with very large eye-like spots, which give it a grotesque appearance. Mrs. M. E. Barber, in a paper read before the Linnean Society, mentioned the larva of a species of *Chærocampa* which feeds on *Convolvulaceæ*, and which in its younger stage is green, but becomes dark coloured prior to burrowing, at which period it may be seen wandering about the ground. The species is extremely abundant. The larva of *Antheræa Tyrrhea* is so abundant in some seasons that the thorn-trees (*Acacia horrida*) are stripped of their foliage over miles of area. The caterpillar is conspicuously marked with black, white and yellow; when touched it jerks its head backwards and ejects a quantity of a nauseous green fluid. Mr. Weale stated that he had never seen it attacked by birds, although it is often infested with ichneumons. The moth—to judge by the number of wounded specimens—is attacked largely by some night-flying animal, probably bats. Many of the larvæ of *Sphingidæ* when seized have a habit of doubling up the body and then jumping a considerable distance with a spring-like action. This is especially the case with species having eye-like markings, and it is probable that if attacked by birds in a hesitating manner, such species might effect their escape amid the grass or foliage.

Mr. Meldola stated that, in the December number of 'Kosmos,' Fritz Müller had recorded a number of most interesting observations bearing upon the subject of the coloration of caterpillars. The larvæ of *Dione Juno* and *Acræa Thalia* live gregariously, and are brown in colour; they are covered with spines, but, being of dull colours, their spiny protection (which in the case of *D. Juno* is very imperfect) would not preserve them unless they were distinguished as inedible at the right time, and not after being seized, in accordance with the principles laid down by Mr. Wallace. It is suggested that the social habits of the larvæ which lead them to congregate in large numbers make up for their want of colour, since their offensive odour then gives timely warning to an approaching enemy. The caterpillars of *Colœnis Julia* and *Dione Vanillæ* are equally wanting in bright colours, but are solitary in their habits, and these species rest on the under side of the leaf when feeding. On the other hand, the caterpillars of *Heliconius Eucrate*, *Colœnis Dido* and *C. Isabella*, which are of solitary habits and which freely expose themselves, are very gaudily coloured, and therefore most conspicuous. As examples of nearly allied larvæ, of which some species are gregarious and others solitary, Fritz Müller mentions *Morpho* and *Brassolis*, which are gregarious, while *Opsiphanes* and *Caligo* are solitary. The larva of *Papilio Pompeius* also is gregarious, and those of

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P. Nephalion, *P. Polydamas* and *P. Thoas* are solitary. These and analogous cases are adduced by the author in support of Dr. Weismann's conclusion that the "form-relationship" of caterpillars is more governed by external conditions than by their "blood relationship," so that if a group of insects be classified by their larval characters we should have a totally different arrangement to that which would be given by a classification of the perfect insects. Fritz Müller sums up his observations with some remarks, of which the following is a free translation:—"The caterpillars which live alone and lack the bright colouring as a sign of offensiveness must hide themselves, as those of *C. Julia* and *D. Vanillæ*. The spiny covering is much less a protection against birds than against smaller enemies, and they may by the protective habit of living together diffuse around themselves an offensive atmosphere, even to man, and thus gradually becoming shorter (as with *D. Juno*), the spines of these caterpillars become useless, and finally are altogether dropped." With reference to the conclusions that caterpillars can become adapted to their environment quite independently of the perfect insect, as worked out in a most masterly manner by Dr. Weismann, Mr. Meldola stated that in his belief the principle had been laid down, if not in detail, at least broadly, by Darwin, in the 'Origin of Species.' It is there stated (1st ed., p. 440) that when an animal, during any part of its embryonic career, is active, and has to provide for itself, "The period of activity may come on earlier or later in life; but whenever it comes on, the adaptation of the larva to its conditions of life is just as perfect and as beautiful as in the adult animal. From such special adaptations the similarity of the larvæ or active embryos of allied animals is sometimes much obscured."

Mr. Bates, in conclusion, asked the Society to return their thanks to Sir John Lubbock for his interesting paper, and remarked that the discussion to which it had given rise had elicited much valuable information. The President pointed out that every marking on a caterpillar must have some meaning with reference to external conditions, and that a large and almost untrodden field in this direction yet lay open to the working entomologist.

The following papers were communicated by Mr. C. O. Waterhouse:—"Description of a new Dragon-fly (*Gynacantha*) from Borneo." "Description of a new Species of *Chernitidæ* (*Pseudoscorpionidæ*) from Spain." "On the different forms occurring in the Coleopterous Family *Lycidæ*, with Descriptions of new Genera and Species."

New Part of 'Transactions.'

Part IV. of the 'Transactions' for 1877 was on the table.

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March 6, 1878.

H. W. Bates, F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Election of a Member.

Mr. John Woodgate, of Richmond Road, New Barnet, Herts, was balloted for and elected a Member.

Exhibitions, &c.

Mr. F. Moore exhibited, at the request of Sir W. H. Gregory, late Governor of Ceylon, a large series of beautifully executed drawings, by native artists, of the transformations of the Lepidoptera of that island. These drawings were made under the supervision of Dr. Thwaites, and represent the life-history of many species hitherto unknown. Mr. Moore expressed a hope that the Government of Ceylon would accede to the proposition of having them published.

Mr. M'Lachlan exhibited four parts—relating to Entomology—of the great Russian work, Fedtschenko's 'Travels in Turkestan;' they consisted of two parts on *Hymenoptera*, &c., one on *Coleoptera*, and one on *Arachnida*.

The President called attention to the excellence of some of the plates, drawn, engraved, and coloured in Russia.

Mr. H. Goss exhibited a small collection of fossil insects obtained by Mr. J. S. Gardner, F.G.S., from the Bournemouth Leaf-beds (Middle Eocene). The collection comprised numerous elytra of *Coleoptera*, chiefly *Curculionidæ* and *Buprestidæ*, also wings of an *Æschna* and other *Neuroptera*, &c.

Mr. J. P. Mansel Weale read the following:—

"*Notes on South African Insects.*"

"*Variation in Pieris Severina and P. Mesentina.*—In the paper I had the honour of reading before this Society in July (Trans. Ent. Soc., 1877, p. 265), I remarked upon the variations of tint in some *Pieridæ* according to season. I wish now to point out that Cape specimens of *P. Severina* show in the female a tendency to vary on the fore-wing from a minute spot at the extremity of the discoidal cell to a broad bar extending thence from the costa. In thirty-eight specimens in my collection the mode in which this occurs is well illustrated. At first a slight dark projection occurs on the costa, while the discoidal spot is at the same time sometimes enlarged. In other examples an intermediate dark marking occurs, until at last all these markings become united in a dark band. In one specimen exhibited

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this band is widened so much that I am dubious whether the specimen belongs to *P. Severina* or to *P. Mesentina*, although in most cases a reference to the under side readily decides it. In similar manner on the hind wings the nervures are sometimes fairly defined by black, and a small black mark sometimes defines the outer border of the discoidal cell. In most cases, however, these markings are absent. The males show in the fore wing a similar tendency to vary. In the female of *Pieris Mesentina* the black band at the extremity of the discoidal cell is never absent, and is usually connected with a distinctly dark-bordered costa, but it is in some cases so narrow and broken as barely to join the costa. In the hind wings the markings exceptionally present in *P. Severina* are here normally present. The hind marginal black border in *P. Severina* is broader, darker and less broken than in *P. Mesentina*, and the apex of the fore wing is generally marked with three distinct yellowish spots; while in *P. Mesentina* the border is paler and more broken: in the hind marginal border of the fore wing the apical spots are sometimes absent, and in the hind wings there is generally a distinct row of pale spots, which in *P. Severina* are barely indicated. The general colour of the female *P. Mesentina* is lighter than that of *Severina*, the ground colour being sometimes white; but, as I have said, the ground colour of both forms varies with locality and climate. I have thought these remarks worth recording, because, as we before saw in the males of *Papilio Merope*, a small black dot is sometimes present at the extremity of the discoidal cell, while in *Papilio meriones* there is present a broad black bar, and it has been from the encroachments of such slight variations that Mr. Trimen was led to suspect the true position of the female.

"*Termes trinervius*.—In an account of the first living specimen of the South-American Ant-eater (*Myrmecophaga jubata*) in the Zoological Gardens, Professor Owen remarks, in the 'Proceedings of the Zoological Society,' that attempts had been made to feed this animal with living ants and their larvæ, but that they appeared thoroughly distasteful to it, and he concluded that these insects were refused on account of their secreting formic acid. During my residence in the Cape Colony my attention was attracted to the soldiers of the commonest species, *Termes trinervius*, on account of the apparently meaningless manner in which they ran about, thrusting at every object with their lance-pointed heads. I often placed my finger close to them, but never received any kind of wound, whereas most of the other kinds with which I am acquainted bite severely. One day while watching them with a glass I noticed a small ant come in contact with one, and it immediately seemed disabled. On examining it I saw a gummy kind of liquid adhering to it, and accordingly put a portion of the nest and a number of Termites into a bottle for examination. On opening the bottle I noticed a strong acid odour, and on testing it litmus

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paper was discoloured. On examining the insect under the microscope I observed that the cephalic projection was perforated at the extremity and communicated with a duct. On touching the same part of living specimens a small drop of acid and gummy matter was traceable on the finger. *Termes trinervius* is the common food of the Cape Ant-bear (*Orycteropus Capensis*) and I believe also of the Aardt-wolf (*Proteles cristatus*). Another species of *Termes* has, I think, a similar secretion, but in a less degree. The soldier of this species is armed with prehensile mandibles, and has no cephalic projection.

"*Larvæ of Hesperidæ*.—In glancing over the pages of the 'Revue et Magazin de Zoologie' for 1875 I noticed a paper by Dr. Burmeister on the larvæ of *Hesperidæ*, and as I have myself discovered and reared those of *Pyrgus Elma* and *Ismene Florestan* in Kaffraria, I thought it might be of interest to make a few remarks on this subject. Both the Cape species cover themselves up in a fold of the leaf, and from what Dr. Burmeister states I imagine the same is the case with those of South America. Of the four species figured by him three are greenish, and one conspicuously marked. The larva of *Ismene Florestan* is ringed with purplish brown and pale Naples yellow, but the cuneate head is bright reddish yellow with black spots. That of *Pyrgus Elma* is pale green and somewhat whitely pubescent —in fact, exactly the colour of the under surface of the leaves of its food-plant (*Abutiton gonucratiacum*)—but its head is blackish. Both caterpillars feed principally during the night, and in feeding their heads are the only conspicuous parts of their body. Here is a case in which a protective resemblance in larvæ is apparently useless."

The President remarked, with reference to the secretion of formic acid by the cephalic process of soldier Termites, that although he had carefully studied species of Termites having similar processes, he had never observed such secretion.

Papers read, &c.

Mr. E. Saunders read a paper entitled "Remarks on the Hairs of some of our British *Hymenoptera*." The author had examined microscopically the hairs of one or more species in almost all the genera of British *Aculeata*, and had come to the conclusion that the presence of branched or plumose hairs is characteristic of the *Anthophila*, although this character is of no further value for making divisions within this section. The hairs of the Fossores, of *Heterogyna* and the *Diploptera*, are all simple, or in some cases twisted. Mr. Saunders distinguished nine distinct varieties of hairs, and suggested that the plumose hairs of the *Anthophila* may be of use in collecting pollen.

Mr. F. Smith remarked that he had first observed beautifully plumose hairs in bees from Australia.

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Mr. M'Lachlan suggested that the branched hairs might serve the double purpose of assisting in the collection of pollen, and also of interlocking the hairs of the bees together so as to preserve pubescence.

Mr. Saunders stated that plumose hairs were found also among the burrowing species of *Crustacea;* but if this character were for the purpose of keeping the bees clean from sand, &c., one would have expected to find it in the *Pompilidæ*, and in the species of Fossores which burrow just as much as the *Anthophila*.

Mr. A. G. Butler read a paper "On the Natural Affinities of the Lepidopterous Family *Ægeriidæ*," in which he showed that the structural characters of these insects presented no resemblance to the *Sphingidæ*, with which they had hitherto been allied; but that they were more related, on the one hand, to the Pyrales, and on the other to the *Gelechiidæ*.

Mr. M'Lachlan pointed out that the effect of this arrangement would be to place between the *Sphingidæ* and the *Ægeriidæ* the whole of the Bombyces, *Geometræ* and *Noctuæ*, and part of the Pyrales.

Mr. Jenner Weir stated that he perfectly agreed with Mr. Butler's conclusion as to the want of affinity between the *Ægeriidæ* and *Sphingidæ*.

The President remarked that an argument in favour of Mr. Butler's view was to be found in the fact that nearly the whole of the *Ægeriidæ* had been made to depart from their congeners in appearance through the action of mimicry, their narrow transparent wings having been modified in imitation of various Hymenopterous insects.

Mr. Peter Cameron communicated a paper "On some new Genera and Species of *Tenthredinidæ*."

The Secretary read a paper by Mr. A. H. Swinton entitled "The Biology of Insecta, as determined by the Emotions." The author had collected a large number of observations showing the various means by which insects express fear, love, rivalry, &c. The present paper dealt chiefly with cases of simple muscular contractions and secretions.

Mr. J. W. Slater suggested that the red secretion of *Timarcha* might possibly be found to owe its colour to alizarine derived from its food-plant.

The President requested that authors would communicate the titles of their papers to the Secretary at least twelve days before the meeting at which they are to be read, in order that advertisements might be inserted in the proper journals.

Copies of Professor Westwood's 'Address delivered at the Anniversary Meeting,' on January 16th, were on the table, for distribution among the Members.

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April 3, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Election of a Member.

Miss Eleanor A. Ormerod, of Dunster Lodge, Spring Gro e, Isleworth, was ballotted for and elected a member.

Exhibitions, &c.

Mr. McLachlan called attention, with reference to Mr. Mansel Weale's observations on *Termes trinervius* made at the last meeting of the Society, to a statement in Hagen's "Monographie der Termiten" ('Linnæa Entomologica,' xiv., p. 86), given on the authority of Osten-Sacken, respecting *Termes Rippertii* of Cuba, the soldiers of which species are said to exude a drop of clear liquid from the point of the head when handled. Mr. McLachlan said that it was interesting to find that Mr. Mansel Weale's observations had confirmed those formerly published.

Mr. F. Grut exhibited, on behalf of the Rev. T. A. Marshall, a collection of insects made by the latter in the Windward Islands, and read a letter which accompanied the collection.

Mr. F. Smith exhibited a series of specimens of a species of "Harvesting Ant," sent to Mr. Darwin from Florida, U.S., by Mrs. M. Treat. On comparison, the Ant appears to be identical with the species from Texas, *Myrmica barbata*, the *M. molifaciens* of Buckley. Three phials containing ants were sent, one containing specimens gradating from large soldiers to small workers, all having acutely dentate mandibles. A second phial contained ants varying in size, but all with mandibles having rounded teeth; in the specimens in the third phial the teeth were obsolete. Mrs. Treat's letter did not make it clear whether intermediate forms of teeth are to be found in nests, or whether it is to be understood that three distinct races exist in colonies, each being thus constituted for the performance of distinct functions. Mr. Smith stated that he had entered into correspondence with Mrs. Treat, and hoped shortly to obtain further information.

Mr. Alexander A. Berens exhibited a pair (male and female) of *Thestor Mauritanicus*, Staud., taken on the Atlas Mountains, in Algeria, in April.

Mr. M'Lachlan exhibited a coleopterous larva (probably a Buprestis or Longicorn) belonging to the tribe known as "coffee-borers," sent from

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Zanzibar by Dr. Kirk. He also exhibited a portion of a stem which had been bored into by the larva, and which was especially remarkable on account of the presence of a series of holes nearly equidistant, and bored in a direction perpendicular to the main gallery. These holes, which opened a communication between the inner gallery and the outer air, were of a conical shape, the inner opening being the widest, and Mr. M'Lachlan suggested that they were made by the insect for the purpose of ventilating the gallery.

Mr. Smith remarked that he had bred numbers of a Longicorn beetle (*Saperda populnea*), and had frequently observed in the shoots of the aspen, in which the insect undergoes its transformations, similar small holes, which in this case are made by a parasitic Hymenopterous insect.

Mr. W. C. Boyd exhibited a specimen of *Pterophorus lætus*, taken at Deal in June, 1869. He stated that the specimen agreed very closely with the continental *P. lætus*, as does another specimen taken at the same place by Mr. Purday in 1877, but that it differed from the species taken in Norfolk by Lord Walsingham (two specimens of which were exhibited for comparison), which had been returned by Prof. Zeller as being "probably *P. lætus*."

Papers read.

The Secretary read a paper, communicated by the Rev. T. A. Marshall, entitled "Notes on the Entomology of the Windward Islands," in which the author gave a list of the species which he had captured in Barbadoes, Martinique, and Antigua since June, 1877, together with remarks on habits, and descriptions of new species.

The Rev. H. S. Gorham communicated "Descriptions of new Species of *Cleridæ*, with Notes on the Genera and Corrections of Synonymy."

Dr. D. Sharp communicated a paper "On some *Nitidulidæ* from the Hawaiian Islands."

The Secretary read a paper, by Mr. J. P. Mansel Weale, entitled "Notes on South African Insects," and exhibited drawings made by the author in illustration. The paper related to insects found on *Acacia horrida*, and protected by resemblances to various parts of that tree; species resembling birds' excrements, and also some remarkable cases of mimicry of ants by spiders of the genus *Salticus*, were likewise referred to.

Mr. Wood-Mason exhibited and made remarks upon the insects referred to in the foregoing paper, and supplied the names of the *Mantidæ* and *Phasmidæ*. He also suggested that the resemblance of a *Mantis* to bird-droppings might be of use to the insect for purely aggressive purposes, since flies were known to be attracted by such droppings. In conclusion, Mr. Wood-Mason mentioned a case of mimicry of ants by spiders which he had observed in India.

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Mr. Meldola stated, with reference to the imitation of ants by spiders mentioned by Mr. Mansel Weale, that in his belief the remarkably interesting cases made known in the present paper could be better explained as instances of aggressive mimicry by the spiders for the purpose of obtaining food. There is no reason to suppose that the ants are themselves free from persecution by insect foes; thus it would be no advantage to the spiders to resemble them for mere protection. It is stated that the ants visit the trees for the purpose of feeding on the sweet secretions, and that large numbers of flies are attracted with the same object. Now the ants are not predatory on the flies, and can thus mingle with the latter without causing alarm. The spiders by mimicking the ants would thus be enabled to obtain an abundant supply of food, and, not being actually a foe to the ants, would be allowed to live with them on the friendly terms mentioned by the observer.

Mr. A. H. Swinton communicated a paper "On Display and Dances by Insects."

Mr. J. W. Slater communicated the following paper:—

"*On the Secondary Sexual Characters of Insects.*

"To prevent any misunderstanding, it may be well to premise that by 'secondary sexual characters' I mean parts conspicuous in one sex—generally in the male—and either wanting or very slightly developed in the other; but which, at the same time, take no share in the process of reproduction, or at most one quite subsidiary. In many cases, indeed, it is still doubtful whether the parts in question subserve any function at all in the economy of the species. The origin and the purpose of these organs, or portions of organs, has accordingly given scope for much controversy and for a variety of theories. To one of these theories, of recent origin, I wish to direct particular attention. For the sake of convenience the appendages under consideration may be divided into the following classes:—

Projections of the thorax, above, below, or at the sides.

Ridges, tubercles, horns or other extensions of the fixed parts of the head.

Prolongations, enlargements, and complications of the antennæ, mandibles, and palpi.

Special modifications of the legs.

"It will be at once obvious that peculiar developments of the two latter classes are much more easily accounted for than those of the two former. Any theory which professes to give an account of the functions of the antennæ must be able to explain why these organs are in such a multitude of cases longer and more complicated in the male sex than in the female, whilst the contrary arrangement is, I believe, never met with; why we find

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them more highly developed in nocturnal species than in their nearest diurnal allies; in monophagous groups—especially if their food be rare or somewhat difficult to discover—than in such as are polyphagous; and in the sluggish species than in such as are eminent for their locomotive powers.

"The sexual differences in the mandibles and legs need scarcely occupy our attention, since in a very large number of cases their functions have been traced beyond room for doubt, and it is admitted that male insects in which these parts are pre-eminently developed must have an advantage over such as are less highly endowed, and must have a greater chance of leaving a numerous progeny. It has doubtless been remarked how completely the anterior legs of *Eucheirus* simulate the mandibles of *Lucanus*.

"But it is with the sexual developments of the thorax and of the fixed parts of the head that we must mainly concern ourselves, as they are still an unsolved riddle. Naturalists of the new school can scarcely sit down in content and regard the thoracic horns—*e. g.*, of the *Dynastidæ* or *Scarabæidæ*—as mere *lusus naturæ*, or as existing simply to excite the wonder and curiosity of man. Are they weapons? Their shape, their position, the sparing mobility of the parts to which they are attached, and the general difficulty with which they could be brought to bear upon an enemy are strongly opposed to this supposition. Though popularly known as 'horns,' they offer in all these respects a decided contrast to the horns of the *Mammalia*, which are formidable just in proportion as the head of the animal bearing them is capable of rapid and powerful motion.

"Let us take certain extreme cases: in several African and Indian *Onthophagi*, such as *O. rarus*, *pyramidalis*, *amplecticornis*, *Elliotti*, *bonassus*, *hippelaphus* and *imperator*, a pair of processes almost like calliper compasses spring from the angles of the occiput and extend backwards over, and in one case lying flat upon, the thorax and elytra. Or, again, *Peperonata Haringtoni*, which has its thorax prolonged behind in the form of a hook with the point downwards, by which the insect could easily be suspended. Anything worse adapted for weapons could not easily be devised.

"But further, male insects fitted with these so-called horns, have never been seen to use them in fighting, whether with rivals or with enemies of other species. Our worthy President, Mr. Bates, who has examined several species of horned *Coleoptera*, finds no decided evidence, from their mutilated or broken condition, of their having been thus used. I have seen many hundred living specimens of *Oryctes nasicornis* in heaps of spent tan, and have repeatedly and carefully watched their proceedings. But I never saw the horns used as weapons. Indeed I have no note of ever having witnessed a fight between two males of this species.

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"It has been suggested that these horns may either prevent the insects in question from falling on their backs—a position well known to be very embarrassing to beetles—or at least enable them more easily to regain their feet. This might hold good with the *Onthophagi* above mentioned. But the question then arises, why the males should be better provided in this respect than the females?

"Are these horns mining tools? In some species, such as *Typhæus vulgaris*, their structure and position favour this supposition, and the males seem to take a part in the formation of the burrows for their eggs. But in others the horns are very ill adapted for mining either into soil or rotten wood.

"A theory which has been recently put forward regards these projections in common with all horns, tusks, crests, manes, tufts, &c., distinguishing the male sex not merely in insects, but throughout tho animal kingdom, as mainly excrementitious products—as a channel through which Nature relieves herself of superfluous matter. In female animals, it is contended, any excess in nutriment is utilized in the formation of ova, but in the males it is consumed in the production of the class of appendages which we are considering. This view is, if I do not misunderstand him, to some extent sanctioned even by Dr. Leconte, who speaks of 'Vegetative growth of the organs of sense, indicated by pectinate or flabellate antennæ, or excessive length of the palpi' (Silliman's Journ., 1867, xliv., p. 42). It is also maintained, though not by Dr. Leconte, that these horns occur chiefly, if not exclusively, among vegetable-feeders, inasmuch as 'their diet contains an excess of saline matter in proportion to its other constituents.' We have in this last suggestion a perfect complication of errors. Vegetable food, and especially wood, is not richer but poorer in mineral salts than is animal food, and as the frontal and thoracic horns of insects contain merely 6·06 per cent. of mineral matter, they would not offer a convenient channel for the removal of such substances from the system.

"Further, there is no necessary connection between these secondary sexual characters and any particular kind of diet. The *Dynastidæ*, the *Lucanidæ*, the Longicornes, and the *Buprestidæ* agree very closely in their diet, all feeding upon wood in various stages of decay. Yet while the male *Dynastidæ* are, above all other insects, endowed with horns, and the male *Lucanidæ* with enlarged jaws, the male Longicornes have merely an extension or occasional complication of the antennæ, or sometimes of the palpi, and the male *Buprestidæ* are devoid of any of these secondary sexual characteristics.

"Further, parts of this nature are not invariably present in the male and absent in the female. The growth of horns may be approximately equal in both sexes. Thus, in *Phanæus lancifer*, the frontal horn is almost as well-developed in the female as in the male. In certain species of *Onitis* the

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female has a tubercle on the head, whilst the male has none, though furnished instead with a pair of horns on the lower surface of the thorax. Another case mentioned last year at a meeting of this Society shows that a female insect may have a decided frontal horn which is entirely wanting in the male. (Proc. Ent. Soc., 1877, xvii.)

"As the theory we are examining is not limited to insects, I may perhaps be permitted to point out that if it were in accordance with facts, such secondary sexual characteristics would be less striking in the males of polygamous birds and mammals than in those of monogamous species, and would be increased by emasculation—the very reverse of what is actually observed.

"Duly weighing such facts, I think we are driven to the conclusion that the theory of horns and similar projections and enlargements being mere excretory growths—means of getting rid of certain refuse matter supposed to be connected with the male sex rather than with the female, and with a vegetable rather than with an animal diet—is utterly inadmissible. It would perhaps be nearer the truth were we to say that these horns, crests, &c., like the higher and brighter coloration so common in the male sex were the result of a more intense vitality.

"Another theory proposed is that nocturnal habits promote what may be called monstrous developments of different parts of the system. But to this view we may at once take the preliminary objection that nocturnal habits should have a similar effect upon both sexes. It must be, indeed, admitted that a far larger proportion of species are provided with horns and ridges among the *Dynastidæ* and *Scarabæidæ* than among the diurnal *Cetoniidæ*. But, on the other hand, there are abundance of nocturnal groups in which these secondary sexual characters are altogether wanting.

"Are they ornaments attractive to the females, as seems to be the opinion of Mr. Darwin, and are they a result of the action of 'sexual selection'? It must be remembered that in many of the horned *Coleoptera* the growth of these parts varies extremely. In *Oryctes nasicornis* there are males in which the horn is so completely obsolete that they might be regarded as specifically distinct from the long-horned type, if we had not a complete series of intermediate forms filling up the interval. I never, indeed, noticed that the hornless or short-horned males seemed less acceptable to the females than were their long-horned contemporaries. Nevertheless Mr. Darwin's view seems certainly less open to objections than the theories I have already mentioned."

New Part of 'Transactions.'

Part V. of the 'Transactions' for 1877, containing index, title-page, &c., was on the table.

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On the Expression of the Emotions by Insects. By A. H. Swinton.
(Read March 6th, 1878.)

Lamarck, as is known, defined Insecta as sentient animals that obtain from their sensations perceptions only of objects, simple ideas they are unable to combine to form complex ones, which more intelligent animals not only do, but retain notions thus formed. Since the promulgation of this definition, deeper insight has been gained by the investigations of De Geer, John Hunter, the Hubers, Kirby, J. Rennie, Burmeister, Goureau, Müller, Siebold, Westring, Landois, and others, as may be seen in the masterly *resumé* by Darwin and his coadjutors ('Descent of Man,' vol. i., chap. x.) The fuller development and partial localisation of the sensorial organs of touch, taste, smell and sight in larvæ, and of hearing in imagos, having reacted on the nervous system, has led to the production of emotions cognate with the passions, such as fear, love, rivalry, and maternal care. The intensity of these stimuli is indicated by contractions, secretions, battles, display, and dances, vocal and instrumental music, wing beating, or (in the perfect state) migrations.

Simple muscular contractions indicative of fear are evinced by larvæ, pupæ, and perfect insects, and may result from touch, taste, sight, or hearing. Thus, when touched, larvæ contract or roll up, and certain pupæ wriggle. Many Coleoptera on touch turn lethargic, forcibly contracting their legs and antennæ. This is characteristic of hemispherical kinds, such as *Byrrhus*, *Rhyncophora*, *Coprinidæ*, and *Phytophaga*; also of elongate species, such as the *Elateridæ*. Some also depress their heads slightly (*Necrophaga*), or withdraw them into grooves (*Curculionidæ*). Others, instead of contracting the legs, rigidly extend them when alarmed (*Geotrupes stercorarius*), or, porrecting the anterior, contract the hind legs (*Geotrupes lævigatus*); others again partially withdraw them on alarm (*Geodephaga*), while the *Lucanidæ* under these circumstances stand paralysed, gaping with their mandibles. Hemiptera and many Neuroptera, on touch, similarly contract their limbs, the latter with many Lepidoptera retaining their wings motionless. Among Hymenoptera, *Chrysididæ*, on seizure, convolute the abdomen, while others turning on their back extend the intermediate legs. These spasmodic symptoms not uncommonly result from sight or hearing. Thus lepidopterous caterpillars jerk the head to a passing cloud-shadow (*Callimorpha*), and I remember even on approaching a minute coleopteron near London, that its limbs contracted, and it fell down before I could reach it. Many species of Lepidoptera similarly elude the collector.

Muscular contractions on touch or sight, accompanied by an emission of

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liquids or odours from secretory glands likewise indicate fear. Certain coleopterous larvæ thus stimulated drop saliva or exude volatile fluids from two or more dorsal tubes (*Linea tremulæ*), smelling of naphtha, and some (*Lucanus*) have a strong odour of guano. In certain lepidopterous caterpillars the tubes are protrusible, emitting scents like fennel, &c. (*Papilio, Danais*). Vegetable feeding genera of Coleoptera when seized exude amber drops at the leg-joints (*Proscarabæus, Meloë, Chrysomela*), or a glutinous fluid from the body (*Brachynotus*); others drop red saliva (*Timarcha*), or diffuse a musk-like odour from metathoracic glandular organs, as the *Longicornia* (*Aromia, Dorcacerus, Ceragenia, Lophonocerus, Acanthoptera*); others again diffuse perfumes often powerful (*Lamellicornia*), redolent of a scent like Russian leather (*Osmoderma*), or musk (*Trichius*). Carrion beetles (*Silphidæ*) when handled disgorge nauseous saliva, but some emit a musky odour (*Necrophorus*, Fab.) On alarm communicated by touch or sight, *Geodephaga* and *Staphylinidæ* eject volatile secretions from erectile anal tubes, sometimes vapourising with explosion (*Brachinus, Anchomenus, Paussidæ*). The odour they diffuse is that of vinegar or ratafia (*Calosoma calidium, Lathrobium*), and is sometimes powerful (*Cicindela metallica*, Bois.) In *Hydrodephaga* and *Heteromera* the secretory ducts are similar in position, and the odour nauseous (*Gyrinus, Blaps*). The ejection is accomplished in the *Staphylinidæ* by reversion of the abdomen. Species of *Carabus* when handled eject caustic saliva. Hymenoptera on touch diffuse pungent scents; many *Formicidæ* one of formic acid, some of ordure (*F. fœtens*, F.) *Mutillidæ* and *Andrenidæ* give an odour of garlic; *Bembex, Sphex* and *Crabro* of ether, and *Cimbex* of musk. The hemipterous secretory glands, similarly situated exterior to the insertion of the posterior legs, on seizure emit fœtid effluvia, smelling of cucumber, thyme (*Lygæus, Hyoscyami*), or peaches (*Enoplops scapha*): homopterous *Cicadæ* on alarm squirt a clear fluid from the anus. Orthoptera on being handled drop brown saliva (*Acridiidæ, Locustina*), or emit scent from small anal glands (*Gryllotalpa, Blattidæ*), and one Neuropteron of the genus *Chrysopa* gives out a smell of ordure. Rhopalocerous Lepidoptera (*Danais, Euplæa, Acræa*) on seizure at the thorax exude clear white or yellow liquid, as do some Heterocera (*Arctia*), while others (*A. Atropos*) diffuse scents from expansible tufts of hair or 'fans.' The male *Pieris napi* smells of thyme. Both Lepidoptera and Diptera drop red, orange, or white saliva, especially on emerging from the cocoon.

To facilitate the union of the sexes, the male insect is usually smaller, nimbler, or more agile on the wing than the female, or occasionally the converse, such exceptions occurring in all orders. Love is expressed in a similar manner to fear, the mandibles, palpi, antennæ, or fore tarsi becoming secondary sexual characters, which with the anal appendages may become masculine modifications for the purpose of seizing the female, or *vice versâ*.

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Thus male Coleoptera and Orthoptera communicate their desire by a bite, Lepidoptera by strokes of the antennæ or palpi; Hymenoptera and Neuroptera employ the three means, while certain Diptera (*Empis*) toy with the tarsi. Trichoptera seize on the wing. In the *Formicidæ* antennal touch is used as a means of communication.

Secretions also tend to promote intercourse, especially in Lepidoptera, where 'fans' diffusing volatile oils characterise the males, and are extended during sexual union (*Acidalia*). Their situation and scent varies. In certain *Sphingidæ* (*A. Atropos*) they are inserted at the base of the abdomen between the chitinous integumental arcs, lying in a pouch when not in use, but rising to a stellate form as this part compresses previous to the emission of a squeak. These 'fans' are stained of an orange colour in the species under consideration by glands situated at their insertion; they diffuse a pungent odour resembling that of jessamine. The male *Sphinx Convolvuli* redolent of musk is also stated by Passerini to possess these appendages. (See likewise 'Proc. Ent. Soc.,' February 6th, 1878, p. ii.) Fans exist also in many male *Noctuina* (*Acronyncta, Leucania, Mamestra, Phlogophora*) attached to a muscular arm about 2‴ long, and concealed in a pouch beneath the first five dorsal arcs with their secretory glands at the fourth. Their scent, usually of an orange colour, smells of turpentine (*Xylophasia*), vinegar (*Mamestra*), or ratafia (*Leucania*). In *Phlogophora* these fans are black. In other *Noctuina* they are at the anus (*Apamea*), or at the upper part of the second pair of tibiæ, which are grooved (*Catocala*). Among *Geometrina* the fans are placed on the posterior tibiæ of the males of *Boarmia* and *Tephrosia*, and on the submedian fore-wing vein in *Macaria liturata, Cidaria prunata, C. testata*, and *C. populata*. In these the secretion is orange-coloured, smelling of vinegar or turpentine (*Macaria*); in *Acidalia* the fans are on the hind tibiæ, and the secretion is white. In *Herminia*, a genus of the *Pyralina*, the male carries two fans on each fore leg, one inserted at the lower end of the tibia, and the other beneath the first tarsal joint.

Simple anger is manifested by Mandibulata and Haustellata on touch; Coleoptera and Orthoptera by threatening, and Hymenoptera by assailing with their mandibles or by threatening with sting or ovipositor, Hemiptera by pricking with their rostrum. Rivalry, again, although essentially a masculine attribute, is sometimes displayed by the female. On enclosing Orthoptera in the larval, pupal, or perfect state, males and females fight indiscriminately with their mandibles (*Gryllidæ, Locustidæ, Acridiidæ*), or with their raptorial fore-legs (*Mantidæ*). Female *Arachnida* have been subsequently observed to devour the slain. Longicorn Coleoptera, males and females, amputate one another's legs and antennæ with their mandibles, as do *Malacodermæ* (*Telephorus, Meloë*) when enclosed together, while *Rhyncophora* (*Scolytus, Leptorhynchus*) push with their mandibulate

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rostrums. Hymenoptera fight or combine in war; social *Aculeata* (*Bombus, Cerceris*) attack intruders, and wrestle together for the female, while the queen hive-bee (*Apis mellifica*) fights and destroys the fertile nymphs, and their workers destroy the males in summer. Social *Formicidæ* attack on the wing (*Myrmica*), combine in war (*Formica rufa, F. Herculanea*), or employ their slave-making instinct in colonising their nests with alien species (*Formica sanguinea, Polyergus rufescens*). The winged males of the solitary *Mutillæ*, when contesting with the female, will devour rather than relinquish her. Lepidoptera, especially the males, attack their own sex, rising in the air, and striking or breaking each other's wings; some (*Cynthia*) have even been observed to dart after birds or a passing shadow. Male Diptera (*Tipula, Dolichopus*) dash in one another's faces.

Maternal care is displayed by female insects which oviposit, hatch, tend and directly or indirectly provide for their larvæ. In placing their eggs, some species are influenced by smell (*Musca vomitoria*) and others by sight, such as *Trichoptera*, which I have known to attach their ova to a fly's wing in mistake for moisture. Some Orthoptera (*Blattæ, Mantidæ*), provident for their larvæ, lay their eggs in a case, while certain Lepidoptera (*Liparis*) snip with pincers an anal tuft to cover them; other species glue them together. *Cicadæ, Tenthredinidæ*, and some Longicorn Coleoptera, in order to insert their ova, cut twigs with serrated ovipositors, and other tribes use it as a drill. The females of *Fossores* and Lamellicorn beetles employ their mandibles or fore legs for the purpose of excavating holes in friable earth wherein to deposit their eggs. Kirby and Spence mention three instances of females sitting on their ova and tending their young, viz., the genera *Forficula, Perga*, and *Acanthosoma*. This trait is more developed in the *Arachnida* (*Clubiona, Lycosa, Epeira*). Some sterile *Formicidæ*, again, superintend the sun-hatching of their nymphs, and other Hymenoptera tend their young, singly (*Mellinus, Epipone*), or in company (*Apis, Bombus*, &c.), but pregnant insects more often provide instinctively for their posthumous larvæ by constructing a simple nest and storing it with food.

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May 1, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Mr. Dunning drew attention to the fact that the present meeting marked the forty-fifth anniversary of the foundation of the Society.

Election of a Member and Subscriber.

Mr. Henry John Elwes, F.L.S., F.Z.S., of Preston House, Cirencester, was elected an ordinary Member. Mr. Peter Cameron, of 31, Willow Bank Crescent, was elected a Subscriber.

Exhibitions, &c.

Mr. W. L. Distant exhibited a specimen of the Hemipteron *Tetroda bilineata*, Walk., as a remarkable instance of immunity from the effects of damp, the same having been kept in a relaxing-pan for more than four months.

Mr. Distant also communicated a paper entitled "Notes on some Hemiptera-Homoptera, with Descriptions of new Species," in which he drew attention to the uncertainty of generic calculations as to geographical distribution; the Homoptera affording a good illustration in the family *Cercopida*, especially the genus *Cercopis*.

The President remarked that the old coleopterous genus *Buprestis* had, like *Cercopis*, at one time almost ceased to exist, through the generic subdivision it had undergone.

New Part of 'Transactions.'

Part I. of the 'Transactions' for 1878 was on the table.

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June 5, 1878.

H. W. Bates, F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Exhibitions, &c.

Mr. John A. Finzi exhibited a remarkable female specimen of *Anthocharis cardamines*, taken in Darenth Wood, Kent. The under side only of one fore wing possessed an orange patch.

Mr. F. Grut exhibited a specimen of an immature *Mygale* from South Africa.

Mr. D. Greig Rutherford exhibited a series of large cocoons sent by Mr. George Thomson from Mount Camaroons, West Africa, formed by the caterpillars of a species of Bombyx allied to *Anaphe Panda*, Bdv. They were taken at an elevation of 5000 feet above the level of the sea, and judging from the nature of certain twigs and pieces of native cord fastened to their exterior covering appeared to have been found attached to fences or to the eaves of houses. The cocoons are light brown in colour and very irregular in shape, rather flattish, and vary in diameter from four to seven inches. Each cocoon contains from 130 to 150 separate cocoons, each enclosing a larva or a chrysalis in various stages of development, the least mature being near the centre of the aggregate mass. To some of the cocoons were attached a case containing what appeared to be the larva of some species of ichneumon or dipterous parasite. All the smaller cocoons are firmly bound together by layers of a coarse silken material, this aggregation being enveloped by a thin brown lining almost of the consistency of parchment, the whole forming a compact mass, which again is surrounded by a loose silken tissue, while a strong covering of the same material envelops the whole. From this it would appear that *A. Panda*, like some other species of *Bombycidæ*, is social, and that the caterpillars unite in considerable numbers in order to form an aggregate cocoon of sufficient strength to preserve the chrysalis from the attacks of enemies, and probably also against extreme changes of temperature.

Mr. M'Lachlan pointed out the dipterous or hymenopterous nature of the larvæ found in the cases attached to the small interior cocoons, and which were found to be living at the time of exhibition.

Mr. Wood-Mason stated that he had taken such larvæ from Orthoptera and from caterpillars.

Mr. H. T. Stainton stated that the two small ermine moths (*Hyponomeuta padella* and *H. evonymella*) of this country were distinguished from one another by the fact that the larvæ of one species spin up gregariously in

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close proximity, while those of the other species scatter themselves before spinning up.

Mr. Rutherford next exhibited a specimen of a *Papilio* which appeared to be a true case of so-called "hermaphroditism" occurring between *Papilio Cynorta* and *P. Boisduvalianus*, the left side of the wings showing the markings (somewhat interrupted) of the former, and the right side those of the latter species. This specimen seems to confirm the suspicion that the two forms are but the sexes of one species.

Mr. Meldola exhibited photographs of two species of tropical Orthoptera allied respectively to *Pterochroza illustrata* and *P. ocellata*, Serville, which had been sent to Mr. Darwin by Dr. Zachurias, of Chemnitz, on account of the very perfect leaf-like appearance of the fore wings, this "protective resemblance" extending to microscopic detail. The hind wings were ornamented with ocellated spots, probably acquired through sexual selection. Mr. Meldola also exhibited some beetles of the genus *Spermophagus* and their cocoons, which had been found in a packet of seeds of *Cassia neglecta* sent from Brazil by Dr. Fritz Müller to Mr. Darwin. The full-grown larvæ had emerged from the seeds, leaving the latter in a damaged condition, and had spun the small cocoons from which the beetles had issued, these insects having reached this country alive. Mr. Meldola next exhibited the proboscis of a Sphinx-moth caught by the narrow tube-like nectary of a pale yellow *Hedychium*. This specimen had also been sent from Brazil by Dr. Fritz Müller, who states that Sphinx-moths are frequently found caught in this manner. Mr. Meldola, in conclusion, stated that he had been requested by Dr. Fritz Müller to ask the Members of the Entomological Society to aid him in his microscopical examination of the scent-producing organs of Lepidoptera by sending to him, addressed to Blumenau, Santa Catharina, Brazil, wings of butterflies, especially of such species as are not found in that country, the names of the insects in all cases to be given.

Sir Sidney Saunders communicated the following notes by M. Lichtenstein:—

"*On Phylloxera vastatrix and other Plant-lice.*

"Our learned President, Prof. Westwood, had the goodness to mention in his Address for the past year my comments on the genus *Phylloxera*. He justly criticises my having given to the sub-genus established for the grape-root louse the name '*Rhizaphis*,' Planchon, which dates from 1868, and not *Peritymbia*, Westw., which is five years older. In my next work, which will shortly appear, this oversight shall be corrected.

"I now beg to submit to the Entomological Society some new ideas about the cycle of life of Aphidians. Ten years' breeding of large numbers of root- and leaf-lice has led me to the following conclusions:—

"Like all insects, Aphidians are always oviparous. The females are always apterous. That which has so often been termed a 'winged female,'

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and has been thought to be viviparous, is only a larval form, and like all larvæ it produces without any fecundation (as it is sexless) the subsequent form.

"While, however, a larva is generally monothalamous, and gives birth only to another larva, pupa, or winged form, the aphidian larval form is polythalamous and produces many germs.

"On the other hand, aphidian females are also very often (in *Phylloxera*, *Tetraneura*, *Vaccuna*, *Sonizoneura*, *Pemphigus*) monothalamous, that is to say they lay only a single egg, while all insects which have only one larva produce a large number of eggs.

"It is perhaps not easy to imagine a larval form more perfect in its organization than the adult female form, yet this is the case. We know already many genera (*Lampyris*, *Drilus*, *Psyche*), where the female looks quite like a larva, while in aphidians we get a larva more perfect in appearance than the imago, as it has wings and rostrum, which are often absent in the perfect female. But there is always this difference—the larva has no accompanying male form and produces no eggs, but only buds or gemmations. The egg is fecundated only by external influence, the bud or gemmation develops without any external aid. The gemmation can assume the most variable forms of maggot, nymph, &c., the egg keeps always the known ovoid form more or less spherical; the gemmation can even assume the form of an egg, and actually does so in some few aphidians (I know of no other instances except in *Phylloxera*), but the faculty of developing without any fecundation, and being the produce of a larval form without any corresponding male, indicates the true nature of that pseudovum. The biological cycle of the aphidians consists of the usual four stages of life, *viz.* first and second larvæ, nymph, and imago, but each of these stages is subdivided into four moults, and terminates by a form capable of gemmation, and having the appearance of a female imago. I would suggest for them the name of *Pseudogyne*. These *Pseudogynes* appear generally apterous in the first and third stages, and winged in the second and fourth. In this last stage they furnish the sexual forms, and their gemmations are true pupæ, from which male and female forms shortly issue to copulate, and after fecundation the female lays its simple egg, and the cycle begins again.

"I shall have the honour to forward shortly to the Society the complete relation of the history of *Phylloxera* (*Peritymbia*) *vastatrix*, wherein the present ideas are more fully developed; but I thought that it would perhaps interest my colleagues to have this preliminary communication of the results of my breedings.

"The last discovery I have made is that of the sexual forms of *Pemphigus spirothecæ*. I obtained the winged pupiferous *Pseudogyne* from its galls in December, and it deposited its pupæ in a glass tube on the 19th of that

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month. Males and apterous females without rostrum issued from the pupæ very shortly afterwards and copulated. The female laid in the tube a single egg, which it surrounded with a white cotton-like secretion. The young louse, constituting the first stage of the new cycle, made its appearance about the 20th of April. It is now sucking at the leaf-stalk of the poplar, and has already formed its spiral galls. I do not know, however, what becomes of it from May to December, and hope to be able to complete its history.

"*Vaccuna dryophile*, which I also followed up from the egg since November last, has given me to-day the winged *Pseudogyne* of the second stage. I notice that it is of a bright yellow colour, while the autumnal *Pseudogyne* of the fourth stage was dark green.

"*Phylloxera vastatrix*, which passes the winter in the larval form of the third generation, has laid pseud-ova during the last fortnight.

"*Phylloxera coccinea* has already made its galls, or at least has curled the point of the leaf of *Quercus pubescens*, and is at its second moult.

"I have not yet found any *Phylloxera Quercus;* but the *Quercus coccifera*, whereon it begins its life, exhibits as yet no young leaves.

"In *Cynipidæ* I observed *Neuroterus lenticularis* laying its eggs (gemmations) in an oak-bud, which I carefully enclosed in a muslin bag on the 5th of April. A fortnight afterwards the leaves showed the well-known galls of *Spathegaster baccarum*, and to-day I have seen five examples of the latter flying in the muslin bag, where I expect they will copulate, and perhaps reproduce the *Neuroterus* galls. According to my theory, *Neuroterus lenticularis* would be the second stage larval form, or *Pseudogyne* of the *Spathegaster baccarum*. This has already been discovered and published by Dr Adler, of Schleswig. My observation confirms only that of the learned countryman of Fabricius, published last year."

Mr. Park Harrison exhibited some pieces of chalk found in some old shafts at Cissbury, and having peculiar grooved markings on them. Mr. Harrison exhibited the specimens to the Society, in order to learn whether the markings could have been made by insects, and after some discussion he was informed by the President that it might be taken as the opinion of the Society that the grooved markings were decidedly not the work of any insect.

Papers read, &c.

The Secretary read a paper communicated by Dr. Fritz Müller, entitled "Notes on Brazilian Entomology," in which the author gave the results of his observations on the odours emitted by butterflies and moths, as well as facts bearing on various other subjects more or less connected with the theory of Evolution.

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Mr. Meldola, in illustration of the foregoing paper, exhibited the wings of *Antirrhæa Archæa*, showing the "scent-fans" sent over from Brazil by the author of the paper, and likewise a specimen of *Mycalesis Drusia*, Cram., captured by himself in the Nicobar Islands in 1875, and displaying the "scent-fans" of the hind-wings in a very conspicuous manner.

The President remarked that when collecting on the Amazons he had often observed the strong odour of vanilla emitted by certain butterflies. Without a more complete examination of the evidence, however, he was not prepared to admit that the tufts of hair or manes on the wings, &c., of butterflies were the scent-secreting organs.

Mr. Wood-Mason stated that no exception could be taken to Dr. Müller's view from a morphological standpoint, since the hairs, which are modified scales, are in communication with the fluids contained in the tissues of the wing, and thus might easily secrete odours.

With reference to the odours emitted by other insects, Mr. M'Lachlan remarked that when in Sydney he had found, in the bush round that town, a cockroach which gave out a most powerful smell. He also referred to the well-known odour of *Chrysopa*, which is emitted by two or three British species of the genus. No special scent-secreting organ has, however, as yet been detected in these insects.

Mr. Distant stated that he had recently received from the Andaman Islands some cockroaches, which likewise emitted a strong odour.

Dr. Sharp communicated a paper "On some Longicorn Coleoptera from the Hawaiian Islands."

Mr. Peter Cameron communicated a paper "On the Larvæ of the *Tenthredinidæ*, with special reference to Protective Resemblance."

Mr. H. W. Bates read a paper "On *Macropsebium Cotterilli* and other new Species of Coleoptera from Lake Nyassa." The author exhibited a specimen of the remarkable Longicorn beetle above referred to, which is of special interest on account of its possessing some characters of the *Prionidæ*.

Notes on the Entomology of the Windward Islands. By the Rev. T. A. Marshall, M.A., &c. (Read April 3rd, 1878.)

The insects I have collected since June, 1877, are on the point of being sent (with some exceptions) to the Entomological Society, and it seems that a few notes on the subject of West-Indian Entomology may be an appropriate and not uninteresting accompaniment. I spent ten days only in Barbados, and may dispense with any further mention of that island, as I found nothing in its burning hot cane-fields and noisy unsavoury

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villages, crowded with 180,000 negroes, except what I had afterwards better opportunities of taking elsewhere. I spent the whole of September in Martinique, and the rest of the time up to the present date in Antigua.

Martinique, the largest and most picturesque of the Antilles, with lofty volcanic mountains, an attractive flora, including forests of almost Brazilian magnificence, well watered, moderately peopled, cultivated only as to about three-fifths of its surface, and without mosquitoes, appears at first sight the *beau-ideal* of a tropical island, and I anticipated great entomological success from its exploration. I have since, however, adopted much more moderate views of the productiveness of that and other West Indian islands. Trinidad, which I have not yet visited, is reported to possess a much more luxuriant fauna; but it may be regarded by the naturalist as forming rather a continuation of the continent, than as one of the Antilles. My quarters in Martinique were fixed at Bourg du Précheur, a village at the foot of Mt. Pelée, from which various romantic gorges lead up to the peak, and were selected for the scene of operations. By repeatedly camping out on the mountains, and by daily assiduity, I succeeded in obtaining a good many of the local species, but the meagre results are not a little surprising to a European, who learns for the first time that splendour of vegetation is not uniformly accompanied with a proportionate luxuriance of animal life. The climate at the elevation of a few thousand feet becomes very supportable, subject to the drawback of sudden discharges of buckets full of rain, which at the summit of the Pelée and the Pain de Sucre even assumed the form of hail. A strong party is desirable in exploring these fastnesses, as the cutlass must be laboriously used, as well to force a path through the primæval forest as to chop up poisonous serpents (*Bothrops lanceolatus*, Wagl., belonging to the family of the *Crotalidæ*), which are dangerously common in Martinique. In various excursions I saw six, and one was killed by a Frenchman in my company. The knowledge of their existence and the necessity of constant caution are decided drawbacks to enjoyment.

The island of Antigua, which I have had much more leisure to examine, is of a different and less attractive character. It is not of volcanic, but of secondary formation, and therefore less elevated; nevertheless, a range of inferior mountains crosses its southern side. The vegetation is of a much less striking character; the woods which clothe the hill-sides consist of smaller trees, and the plains are overrun with a thorny acacia, cactuses, and other growths adapted to a soil destitute of running water. The majority of the insects are minute, and if they form (as they are said to form) an outlying colony of the fauna of Guiana, they are stunted and degenerate, representing the species of the American mainland in the same sort of way as the outer Hebrides represent those of Great Britain.

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I have taken some pains to collect thoroughly, and among the obscurer species of orders too often neglected, which I send home, undescribed forms are very likely to occur.

Much has been said of the difficulty of preserving collections from the ants in tropical countries. After losing many of my best captures, I adopted the principle of the hanging-cupboards or larders used in the West Indies. A large shelf or tray is suspended from the ceiling by a wire passing through a funnel which is filled with oil. The security thus obtained is perfect, provided the boxes placed on the shelf are kept shut to prevent the entrance of flying *Blattæ*. Cabinets and boxes containing old dry specimens offer no attractions to ants, and are as safe as they would be in Europe. The rapidity with which insects dry in this climate, and their immunity from mould and damp, are considerable advantages. A large and handsome *Lepisma* (*L. collaris*, F.) abounds in Antigua, devouring entomological specimens as well as books; but it may be excluded from the former without much difficulty. There are but few species of ants here, and all are minute except *Odontomachus*, which fortunately does not enter houses. Two species only, the red and black, of which I am anxious to learn the names, are formidable to the entomologist, and especially the all-prevailing red ant. The blacks confine themselves to the floor for the most part, and, notwithstanding their agility, do not climb. The red species perambulates walls, ceilings, and furniture, night and day, having a special *penchant* for exploring holes and crannies. It will attack living insects if imprisoned, making its way through the corks of test-tubes, and into boxes even in the collector's pocket. In one night a powerful crustacean (*Gecarcinus ruricola*, L.), which I kept in a cage, was totally dismembered and cleared out by the red ants. The crab must have shot his limbs successively, as they were attacked, until nothing but the carapace remained. The sudden concentration of a force of thousands of ants upon a given point, remote from their nest, is difficult to explain, unless we suppose that the first discoverer of a prey does not stay to regale himself selfishly, but hastens to give notice by some occult means to the community of which he is a member. This requires confirmation, but the sequel may be witnessed any day. The enterprise is conducted with equal promptness and intelligence. Two lines of march are at once established, one hastening empty-jawed to the scene of plunder, the other returning loaded, so long as a single morsel remains. Some imperfect proceedings of this kind are attempted by European ants, but nothing on so grand a scale or with so complete an organization.

A too limited knowledge of names prevents me from specifying many of the insects I have taken, but such as I have ascertained shall be mentioned here. The species not known to me I send, together with a few duplicates, to the Entomological Society.

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Coleoptera.

These insects are very scarce, and large families of them altogether wanting. In Antigua, especially, one might live for weeks without suspecting the existence of any beetles. Minute researches alone produce a few insignificant species, and a few more, mostly Longicorns, fly at night and are attracted by lamps. I have never yet seen a coleopterous insect abroad in the daytime, except the common *Cicindela*.

Tropidosternus lateralis, F. In one of my cattle-ponds, Antigua.

Pæderus thoracicus, Er. On the summit of Mt. Pelée, Martinique.

Passalus interruptus, F. In rotten timber, forests of Martinique.

Asaphes decoloratus, Say. Flying by night, commonly. Antigua.

Chalcolepidius sulcatus, F. Four specimens of this fine insect taken in the forests of Martinique.

Adelocera subcostata, Cand. One, flying by night. Antigua. Hitherto known as from Guadaloupe.

Pygolampis vittigera, Sch.? The so-called "*vers luisant*" of Martinique. Both sexes shine equally, and exhibit a beautiful effect, like falling stars, among the trees on the mountains. See Newm., 'Zoologist,' p. 42.

Rhynchophorus palmarum, L. Common in Martinique in the dead stems of *Areca oleracea*, L. The larvæ are called "grou-grou," and are eaten by the negroes and the lower class of French. I saw a hat full so disposed of during my ascent of the Pain de Sucre. They are eaten both raw and roasted. In the latter case a sharp stick is run through their heads, and they are held in the fire to wriggle and sputter until cooked. One cannot watch a native bolting these hot greasy morsels, only half dead, without considerable emotion.

Exophthalmus festivus, Sch. Not uncommon in Martinique.

Pasandra brunnea, F. Forests of Martinique.

Trachyderes succinctus, F. Flying about the tops of orange trees in a convent-garden. Martinique.

Tæniotes scalaris, F. Forests of Martinique.

Chlorida festiva, F. One specimen, flying by night. Antigua.

Elaphidion glabratum, F.; *Eburia decemmaculata*, F.; *Amniscus præmorsus*, F.; *Achryson circumflexum* (var. *pallens*), F. Common in Antigua, flying by night.

Coccinella immaculata, F. Common. Antigua.

Chilocorus nitidulus, F. In abundance on a single tree. Martinique.

Orthoptera.

The commonest is a moderate-sized locust (*Acridium flavofasciatum*, DeG.), which occurs uninterruptedly from June to March, and I presume all the year round. One or two smaller species I have not yet examined.

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Phalangopsis annulipes, Serv., is common in my house, and is a curious and beautiful species, performing the same functions as the house-cricket in Europe. Its feeble chirp, uttered at considerable intervals, may be heard throughout the night, and I have learned to distinguish it from that of the small musical toad, and other nocturnal sounds. Both sexes are apterous. It is imperfectly described by Serville from the larva only. A species of *Brachytrypes* is frequent here under stones, forming burrows like those of *Gryllus campestris*. *Platyphyllum coriaceum*, L., I met with twice in Martinique. *Conocephalus maxillosus*, Serv., and *Phylloptera cassinifolia*, Serv., both fly to lamps at night in Antigua. About six species of *Blattidæ* are very conspicuous, and two of them (*Periplaneta Americana*, L., and *Panchlora Maderæ*, F.), if not more, are common household pests. The latter is known here as "the drummer," from its making a very peculiar noise at night, resembling that of a very distant Nightjar. I have not yet discovered how this sound is produced, for the insects are silent if they find themselves observed, and those which I kept in confinement were uniformly mute. A species of *Bacillus* occurs on the mountains both here and in Martinique: I have both sexes from Mt. Pelée. Lastly, an apterous *Forficula*, with white rings on the antennæ, inhabits Antigua, being everywhere frequent under stones.

Hymenoptera.

The *Tenthredinidæ* and *Cynipidæ* are not to be found. The *Ichneumonidæ* seem to be very scantily represented, and the absence of these and other parasitical tribes may account for the astonishing numbers of Lepidoptera. Two species of *Ichneumonidæ* have fallen in my way—*Henicospilus flavus*, F., which is somewhat common, and one of the *Campoplex* group, rufous with a black metathorax and no areolet, probably constituting a new genus. *Evania lævigata*, Latr., may be found wherever cockroaches harbour. Of the *Braconidæ* I have taken a new *Chelonus*, which swarmed on flowers in July, and a nondescript pale fulvous insect allied to it, and which flies only at night. Two fine *Bracons* occurred in the forests of Martinique, a new *Spathius*, and a single minute *Microgaster*. A single *Chalcis* occurred in August, being the only specimen of that numerous family which I have seen. The *Oxyura* are absent, except a single *Gonatopus* from Antigua, and the same remark applies to the *Chrysididæ*.

Sphex crucis, St. F. Not uncommon in Martinique.

Pelopœus lunatus, F. Abundant, forming its nests on the roofs and walls of buildings, provisioned with paralysed spiders, usually all of one species in the same nest. Martinique and Antigua.

Monedula signata, Latr. Frequents the sandy shores of Antigua, and has the habits of *Bembex* in the South of Europe. It flies with inconceivable

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velocity, in the hottest situations only, and is best captured by seeing it enter a burrow, and then digging it out, if the operator can endure the sun's rays for a sufficient time.

Scolia (*Colpa*) *rubida*, St. F., is one of the commonest of Hymenoptera, on flowers, in Martinique and Antigua. The undescribed male strikingly resembles *canescens*, Scop. To hazard a conjecture as to the origin and habits of this abundant species I suspect it would be found to be a parasite of the dark brown Lamellicorn of which I send home specimens (No. 10), and which is the only beetle found in Antigua of sufficient size and frequency, for *Phileurus* is much too rare.

Plesia hæmorrhoïdalis, F. (male and female). I had the good fortune to secure a pair of these insects in Martinique. The male is undescribed.

Odontomachus unispinosus, F. The largest ant I have seen in the West Indies. It forms small colonies under stones in woods. In one of these were the winged sexes, but they all escaped. Many winged *Formicidæ*, including a large *Ponera*, habitually visit my lamps at night, but I cannot refer them with certainty to their respective workers. Martinique and Antigua.

Formica sex-guttata, F. Common. I have taken the male and female from a nest. Antigua.

Formica castanea, Latr. Forms large nests in rotten wood. Workers only found. Martinique.

Myrmica melanocephala, F. A minute and active species, which is a pest in houses in Martinique, and destroyed some valuable specimens of mine. Apparently not found in Antigua.

Aphanogaster vorax, F.? Perhaps the name of the common red ant. None of the *Formicidæ* hibernate here; they are to be found feeding their larvæ, and actively employed at all seasons, though in diminished numbers from November to March.

Pepsis rubra, Drury. Very abundant in Antigua and Montserrat, but not in Martinique. A splendid insect, conspicuous for its scarlet wings. The red colour is due to scales, which are liable to be rubbed off, as in Lepidoptera. In old abraded specimens of the female the wings are almost hyaline. The undescribed male differs in having the wings blue-black, with only a small red patch in the middle, and is liable to vary much in size, some dwarfish individuals not exceeding four lines in length. These males have a singular habit of congregating towards sunset in large numbers, apparently for no other object than to sleep in company, on the branches of trees and shrubs. I counted over seventy in one of these swarms, without a single female, and fresh arrivals were taking place every moment. A larger *Pepsis*, blue-black, with white tips to the wings, takes the place of this species in Martinique, but I only succeeded in capturing one specimen. A third species, also from Martinique, has a little red on

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the wings, and the antennæ tipped with yellow. Of this I took a single female. A fourth species, with luteous antennæ, and otherwise blue-black, occurs rarely in Antigua, and may be the male of *ruficornis* or *luteicornis*, F.; but the described sex I have not seen.

Tachytes bella, St. F. Inhabits sandy places in Antigua, commonly.

Tiphia Cayennensis, St. F. Three specimens from Martinique.

Tiphia ephippium, F. A large species, having a square testaceous patch on the mesothorax. Two females from Antigua.

Polistes cinctus, St. F. The common wasp of Martiniquo, and found more rarely in Barbados. Not known in Antigua.

Polistes Poeyi, St. F. An elegantly marked species, which takes the place of the preceding in Antigua. The male appears in January, and is undescribed. It differs from the worker only in being more slender and in having longer antennæ. The nests of both these species are identical in structure, though the cells containing *cinctus* are necessarily a trifle larger. I brought away a nest of *cinctus* from Martinique, and several of the nests of *Poeyi* are now (March 6th) in progress in my stable, and attached to the blades of the American aloe around the house. A small species with yellow bands like an *Odynerus*, and another entirely black, complete the *Diploptera* which I have met with.

Of bees there are few species. *Apis mellifica*, L. (introduced), is frequent, both in a domesticated and a wild state; in the latter case living in the trunks of trees. I have also collected the following species, and have reason to think that in Antigua, at least, there are hardly any more:—

Megachile lanata, F. Common. I once found them clustering together on a shrub, like honey-bees when swarming. Antigua.

Megachile rufipennis, F. Rather common, building its nest in the locks of doors, and other inconvenient places in houses.

Mesoplia azurea, St. F. Four specimens on flowers, Martinique. Had I not been driven from my station by the intolerable sunshine, I might have taken several other species of bees at the same spot.

Xylocopa grossa, Drury. The commonest species in Martinique. A smaller species also occurs, of which I took some females, and also, I believe, the fulvous male. None of this genus are found in Antigua, and an *Anthophora* (also to be met with in Martinique) completes its meagre list of *Apidæ*.

Neuroptera.

The dragon-flies are well represented, being bred in profusion in the stagnant pools of Antigua. They include *Libellula umbrata*, L., *abdominalis*, Ramb., one or more red species, and a pale green one having the abdomen banded with black, &c. The last is very common in Barbados. I have noticed three or four species of *Agrion*, and two of *Myrmecoleon*.

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One of the latter genus has a black fascia on the hind wings. *Ulula senex*, Burm., is not uncommon, and seems to be the only example of the *Ascalaphidæ*. A small *Mantispa* (undescribed?) occasionally visits my lamps at night, and with this species I connect an apterous form found twice under stones, which is probably a pupa. *Termes destructor*, F. (?), is the only species of white ant found in Antigua, and probably in Martinique. Its black, rough, porous nests, resembling certain fungoid growths, are usually attached to trees, but the timber of buildings, and even furniture, are not exempt from its ravages. Long covered ways, extending from floor to ceiling, were lately to be seen in one of my churches; and I have been cautioned more than once against sitting upon chairs and sofas known to be no longer safe, owing to their excavating the legs. A little heap of sawdust on the floor every morning exhibits the progress of their labours during the night. Kerosine oil is used here for their destruction, and arsenic is still more efficacious, as the insects themselves diffuse it throughout the colony, by preying upon the poisoned bodies of their companions. Their nests are the resort of such carnivorous insects as exist here, and in the centre of one of them I captured a large *Scolopendra*. The winged sexes appear in July and August, at which time I met with them in some numbers, flying on the sea-shore, as well as in houses, but only after sunset.

Lepidoptera.

Of Rhopalocera I have obtained only nineteen species, of which seventeen belong to Antigua, and are, I believe, all that are to be found in the island, except one. This last is a large butterfly of rapid flight, black, with white spots, which I saw once on the mountains, but was unable to approach. Almost all the species are very abundant, constituting the principal entomological feature of the country; hundreds are often in sight at the same moment. I am ignorant for the most part of the names of tropical butterflies, but the following identifications are perhaps correct:—

Papilio Polydamas, L. On mountains in Antigua; commoner in Martinique.

Danaïs Erippus, Cram., and *Dione vanillæ*, L. Abundant in Antigua and Martinique.

Anartia jatrophæ, L. Moderately common in Antigua; not seen in Martinique.

Eurema Lisa, Boisd. In profusion in Antigua; not in Martinique, where its place is taken by a different species of *Eurema*.

Colænis Delila, F. Common in Martinique.

Thymele Proteus, L. In woods in Antigua and Martinique.

Several fine *Sphingidæ* are abundant, including *S. Carolina*, Drury, the larvæ of which find their favourite plant on my ground; *S. cingulata*, F.; at least two *Deilophilæ*; and the insect described as *Zygæna Panthalon*, F.

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The number of moths, great and small, exceeds computation, but of them I am not qualified to speak. Strongly suspecting that there must be some of the minuter kinds unknown to Science, I have often regretted my inability to make them an object of pursuit. I have, however, occasionally detained a few of my nightly visitors when remarkable for structure or beauty, and if specimens are desired by any English lepidopterist, I shall gladly endeavour to secure more.

Heteroptera.

Of some forty or fifty species which I have seen, the following are all at present identified:—

Leptoscelis lunata, F. Not common in Martinique.

Spartocera mœsta, F. Abundant in Martinique and Antigua.

Lygæus aulicus, F. Common. Feeds on the *Asclepias Curassavica* (Negro Ipecacuanha). Barbados, Antigua and Martinique.

Dysdercus suturalis, F. Common. Antigua.

Alydus cruentus (or *pilosulus*?), H.-Sch. One specimen. Antigua.

Aceratodes meditabundus, F. Martinique.

Pentatoma obsoleta, Dallas. Antigua.

Cimex prasinus, L.? Indistinguishable from European specimens. Martinique and Antigua.

Stenopoda cinerea, Lap. Flying by night; lurks beneath stones during the day. Antigua.

Euagoras rubidus, Le P. & Serv. Common in Antigua; may frequently be seen sucking the juices of butterflies. It lays long tubular or rather fusiform eggs, agglutinated in a mass to the leaves of plants; each egg is biarticulated, or furnished with a whitish cylindrical prolongation, which does not contain any part of the embryo. The young scarlet larvæ are hatched in about eight days.

Stagnant ponds here produce two species of *Anisops*, and two of *Corixa*; the latter fly abundantly by night. I have also noticed the cast skins of a large water-bug, probably *Belostama*, but the living insects were not to be found. A pale, mealy-looking *Cicada*, two or three *Flatoid* insects, a *Liburnia* (perhaps *saccharivora*, Westw.?), and a few minute *Cicadulæ*, comprise the Homoptera.

Diptera.

With the exception of *Culex*, *Simulia*, and two species of *Musca*, Diptera are exceedingly scarce in the islands I have visited. In Martinique the so-called mosquitoes (*Culices*) are nearly absent, so that the inhabitants sleep without the protection of gauze curtains, while in Antigua those insect-furies never cease from harassing. Probably the rapid mountain-streams of

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Martinique are not favourable to gnat-larvæ, while the stagnant ponds and tanks of Antigua are congenial to them in a high degree. The whole tribes of *Chironomidæ*, *Tipulidæ*, *Empidæ* and *Tabanidæ* seem unrepresented. Horses and cattle are indeed infested with an *Ixodes* of large size (imported originally from Puerto Rico), but they enjoy complete immunity from dipterous plagues and blood-suckers. At a hovel in the mountains of Martinique I took a single *Bibio*, with black wings and testaceous thorax. In the same island occurred one *Asilus*, and several of a cognate genus having a peculiar neuration. The following Diptera I may venture to name:—

Hemetia sexmaculata, Mcq. On flowers, Martinique; one from Antigua.

Eristalis vittatus, Mcq. Common; Martinique and Antigua.

(*Volucella*?) *obesa*, F. Rather scarce; Martinique.

Lucilia putrida, F. Not common; Martinique and Antigua.

Lucilia macellaria, F. This fly exists in considerable numbers, and, in conjunction with a red-tailed *Sarcophaga*, frequents carrion. The house-fly, which swarms everywhere, and especially near sugar-mills, answers the Fabrician description of *M. occidua*, except that he states it to be "triplo minor" than *M. domestica*. It is, however, rather larger and far more importunate.

A good-sized *Tachina* occurs in Antigua, but is very rare. In Martinique I found a species of *Dexia*. The *Anthomyiidæ* are not represented. The smaller *Muscidæ* are few in number; I have noticed a *Drosophila* which feeds on paste; and the *Agave Americana* is inhabited by an *Oscinis*. The *Pulicidæ* are reasonably common, and among them the notorious *Sarcopsylla penetrans*, Westw., inhabits the interstices of boarded floors; I have taken the male in my house.

Arachnida and Myriopoda.

In Martinique I took a fine series of *Mygale versicolor*, Walck. The blue and red hairs which adorn this species during life considerably mitigate its repulsiveness. In resides in holes of trees, spinning a silken curtain, or door, to close the entrance, and is an inoffensive and rather sluggish animal. Antigua produces, instead of this, *Cteniza nidulans*, Walck. In Martinique I captured two large specimens of *Phrynus marginemaculatus*, Koch. Uniting several of the attributes of crab, scorpion and spider, to a diabolical disposition, these beings are perhaps Nature's masterpiece of hideousness. They are found clinging to the under-surface of stones, and when molested run backwards and sideways with great celerity, presenting their spiny pincers at the enemy, while the first pair of legs, useless in progression, is thrown over the back. These singular organs are 5¼ inches long in one of my specimens. In Antigua occurs a much smaller kind, *P. pumilio*, Koch. There are two species of scorpion, one an elongate pale

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yellow species, found in old buildings the other smaller, dark brown, and with a stout tail, peculiar to the mountains. The former is somewhat like the description of *Scorpio Americanus*. *Polydesmus Drurii*, Newp., and *Iulus Beauvoisii*, P. Gerv., are frequent in rotten timber in the forests of Martinique. For another species of *Polydesmus*, common here and in Barbados I can find no name. I have taken several species of *Scolopendra*, which, notwithstanding their size (4—6 inches in length), are difficult to identify. On the 5th February I collected some individuals of *S. platypus*, Brandt., one being a female with white young ones, 4½ lines long. These have twenty-one pairs of legs like the adults, and are in all respects perfectly formed. When all the *Scolopendræ* were inclosed together in a tin box the young ones had the instinct to select their own mother, and to attach themselves, to the number of thirty or forty, to her under-side and legs. The colours of this species fade after death, and it may be remarked that the descriptions of authors, usually made from examples preserved in alcohol, convey no idea of the colours during life. The head and antennæ of *platypus* are of a bluish green; the body pale brown, with the hinder or reflexed margin of each segment bluish; the legs are lemon-yellow, except the hindmost pair, which are pale brown. After death the whole animal becomes dull ferruginous. A species of *Scolopocryptops* (a genus destitute of eyes), which I captured in the forests of Martinique, appears to be a novelty, and as I have at hand the description of it which I prepared, I may as well give it here:—

Scolopocryptops Antillarum, n. sp.

Dark ferrnginous. Antennæ 17-jointed; joints 1—7 stout; 1—3 glabrous, flattened, quadrilateral; 8—17 of much smaller diameter, pilose, cylindrical, tapering to the apex, but not diminishing in length. Labrum transverse, feebly convex, sparsely and not deeply punctured, as broad as the head, subhexagonal, anteriorly depressed, and the sides produced into blunted angles. Cephalic shield punctate. Segments minutely and sparingly punctulate, laterally margined, and with faint indications of three longitudinal striæ, interrupted. Segment 2 very short, annular; the alternate segments throughout shorter than the others, except the last, which exceeds the penultimate in length, is bidentate at the hinder angles, and rounded between them, at the apex. Præanal plate semi-elliptical, depressed laterally, irregularly and feebly punctulate. The two hindmost pairs of legs elongated. The femoral joint of the last pair subcylindrical, canaliculated beneath, unarmed above, and with a single sharp tooth on its inferior surface about one-third from the base—a character which distinguishes the species from those described by Walckenaer and Gervais. Length 3 inches.

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The left antenna, as frequently occurs in these animals, is aborted, having only thirteen joints, and the apical joints, by way of compensation, are somewhat stouter.

Found in rotten timber, Mt. Pelée, Martinique.

Scolopendra Guildingii, Newp., a small species remarkable for the structure of its hindmost pair of legs, is found in Antigua.

July 3, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Election of a Member and Subscriber.

Mr. Basil George Nevinson, of 19, Torrington Square, W.C., was ballotted for and elected an ordinary Member. Mr. John A. Finzi, of 105, Gower Street, W.C., was ballotted for and elected a Subscriber.

Exhibitions, &c.

Mr. F. P. Pascoe exhibited a selection of insects of all orders, as well as of Arachnida and Myriopoda, from a collection recently made during a tour through Algeria and the South of Spain. Among the specimens exhibited were *Scorpio funestus* from the desert, *Geophilus rubro-vittatus*, *Tarisa dimidiatipes*, *Platyblemmus umbraculatus*, *Anthocharis nouna*, *Typhlopone oranensis*, &c. He also called attention to a remarkable Myriopod, having the cylindrical body of the *Julidæ*, but with only one pair of legs to each somite.

Mr. W. C. Boyd drew attention to the food-plant of *Elachista cerussella*, which has always been reputed, both in this country and on the Continent, to feed in the leaves of *Arundo phragmites*. He stated that although he could not positively assert that the insect never feeds on this reed, he much doubted its doing so, as the *Arundo* does not usually come into leaf till the larva of *Elachista* is half-grown. All the specimens which he had bred were found in the leaves of *Phalaris arundinacea*, a grass which somewhat resembles *A. phragmites* before the flower appears; hence, no doubt, the mistake.

Mr. H. T. Stainton remarked that although Mr. Boyd had shown that the *Elachista* larva undoubtedly feeds in *Phalaris arundinacea*, it must still be regarded an open question whether it does not also feed in *Arundo phragmites*.

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Mr. W. L. Distant exhibited an Homopteron which had been sent to him for identification, through Dr. Sharp, from Mr. Lawson, of Auckland, New Zealand. The species was *Ricania australis*, Walker, and Mr. Lawson wrote that it had been observed last year on the dahlia for the first time. The markings of the New Zealand specimen were, however, much darker than those of the Australian ones, and therefore if, as possible, the insect had been introduced from Australia, its arrival must probably have taken place some time ago to allow for the process of melanism which had ensued.

Mr. J. Jenner Weir exhibited two specimens of *Leucania turca*, with several pollinia of *Habenaria bifolia* attached to the trunk of each, these being the only two out of fifty specimens which had the pollinia thus attached. He had been able to satisfy himself, by comparison, as to the species of orchid from which the pollinia had been removed. Mr. Weir also exhibited a specimen of *Hipparchia hyperanthus*, in which the ocelli on the under side of the fore and hind wings were unusually large, oval, and with the central white spots ovate and acuminate outwards. The specimen was taken in the New Forest, and was the first of the species observed at the latter end of June.

Prof. Westwood called attention to a note in 'Nature' of June 27th (p. 226), reprinted from the 'American Naturalist' for June, and relating to the manner in which Lepidoptera escape from their cocoons. The article referred to is by Dr. A. S. Packard, who records his observations on *Actias luna*, and describes and figures the cocoon-cutter by means of which this moth cuts its way out. Prof. Westwood claimed priority for the 'Transactions' of the Society where similar observations are recorded by Capt. Hutton (1st series, vol. v., p. 85), who describes "the method by which *Actias selene* cuts its way through the cocoon," and also calls attention to an instrument which he names the "wing-spur."

Prof. Westwood also stated that he had recently heard of injuries done to potato crops by insects which had not hitherto been considered injurious, viz. *Cetonia aurata*, which had been found stripping the leaves, and a lepidopterous larva (probably a species of *Botys*) which bored into the stem.

Mr. Jenner Weir stated with reference to the organs at the base of the fore wings in the large *Bombycidæ*, that he had distinctly heard a clicking noise in the cocoon of *Attacus polyphemus* just before the emergence of the imago, caused without doubt by the creature's sawing asunder the silk threads with the organs in question. He had not heard the same noise in the cocoons of *Attacus cynthia* nor in those of *A. cecropia*.

Mr. Dunning read the following:—

Note on Spiders resembling Flowers.

"At recent meetings of the Society we have had brought to our notice several interesting cases of resemblance between insects and plants, the

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suggestion being that the insects thereby obtain protection from foes, or that in some other way the resemblance is advantageous to them in the struggle for existence. The following observations, made by my friend Mr. Thomas Nottidge, of Ashford, appear to afford other instances of the same class of phenomena, in which spiders are the possessors of the protective or imitative resemblance:—'On the 11th May, 1878,' Mr. Nottidge writes, 'in the beech woods on the escarpment of the chalk between Westwell and Charing, Kent, I noticed the number and variety of the insects that visited the blossom of the wayfaring tree, *Viburnum*, and on taking the blossom in my hand, I found a spider most beautifully disguised both for protection and for the easier capture of her prey. The spider was all over of a pure creamy white, the exact tint of the flower, and her abdomen exactly resembled the unopened buds—of which there were many in each cyme of blossom—not only in colour, but also in size and shape. Nearly every bunch of blossom was occupied by one or more of these spiders, the young and half-grown ones being just like the full-grown ones in colour. The male was not so well disguised as the female, having a few black dots on his back and some black about the head and jaws. Many of the spiders had captured insects, and one had got a large drone-fly, which was still alive, and which after a long fight escaped. These spiders are hunters, not web-spinners; but I was amused to observe that one which I took in my hand ran up to the highest point at once, and holding up the abdomen let a thread run out on the gentle breeze—the sun was shining and the thread was quite visible—until it touched a twig about sixteen inches from my hand; he then let himself drop from my hand and ran up the thread to the twig; I thought this mode of escape was adopted by spiders only as a *dernier ressort*. I had no means of carrying off one of these spiders. What becomes of them later in the summer? for as soon as the white blossoms are gone, his colour would be a great disadvantage.'

"I was unable to accept an invitation to see these spiders *in situ*, but two or three weeks later I received a further communication from Mr. Nottidge. 'On the 10th June,' he writes, 'at Petersfield, Hants, I found a white spider, very similar to, if not identical with, the one I described to you: he was in the blossom of the wild guelder-rose. He differed from the one I found near Westwell in having reddish brown spots on the side of the abdomen, but they were not sufficiently distinct to interfere with the completeness of his disguise. There were many bushes of the mealy *Viburnum* close by, but the blossom was over. On the same day, and in the same locality, I found a very similar spider on the blossom of *Orchis maculata*, but in this case the spots on the sides of the abdomen were large, of a dark red-brown colour, and very sharply defined; and when the spider stood in his usual position, with his head downwards, these spots very closely resembled in size, shape, relative position, and—at a yard's

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distance—even in colour, the dark purple pollinia of the flowers. I found many specimens of the spider on *Orchis maculata*, one on each spike of blossom, but I searched in vain for one on the dwarf orchis (*O. ustulata*), although this is much like *O. maculata*, but its pollinia are not dark in colour. Can it be that as the season advances this spider changes colour, and that by each successive change it is specially adapted to live concealed on the blossom of some special plant?'"

Mr. Dunning exhibited three living specimens of the spiders captured by Mr. Nottidge at Petersfield, on the guelder-rose and on *Orchis maculata*. Apparently they were all females of *Thomisus citreus*, a common species on flowers, the sexes of which are so dissimilar in size and colour that they have been described as distinct species.

Mr. Jenner Weir remarked that he had lately been observing the habits of the same species of spider in the New Forest, and that he had seen it sometimes station itself in the centre of a composite flower, with its legs expanded like the exterior rays of the flower, and sometimes in the flowers of orchids, with its legs extended horizontally. It appears to be able to destroy even the honey-bee, which he had found dead in its clutches.

The Secretary read a note by Mr. J. Haselden, communicated by Sir Sidney Saunders, relating to the habits of the honey-bee (*Apis fasciata?*) in Egypt.

Paper read.

Mr. C. O. Waterhouse communicated a paper "On New Coleoptera from Australia and Tasmania in the Collection of the British Museum."

August 7, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Exhibitions, &c.

A communication was read from Mr. M'Lachlan, to the effect that, in the writer's opinion, the larva referred to by Prof. Westwood, at the last meeting of the Society, as boring in the stems of the potato, was in all probability that of a Noctua, *Gortyna flavago*, polyphagous in the stems of a variety of herbaceous plants—foxgloves, thistles, burdock, &c.

Mr. S. Stevens exhibited some living specimens of *Teretrius picipes*, found on oak palings at Upper Norwood—parasitic on *Lyctus oblongus*—running

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in and out of the burrows during the hot sunshine; also specimens of *Pachnobia alpina*, male and female, bred by Mr. Clark, who found the pupæ under *Vaccinium* on the highest parts of the mountains above Rannoch, N.B.

Mr. Enock exhibited some remarkable varieties of British Lepidoptera, recently described and figured elsewhere.

Mr. Rutherford stated that he had been successful in rearing certain larvæ associated with the cocoons of a moth allied to *Anaphe panda*, exhibited at a previous meeting. They proved to be those of an ichneumon ascertained by Mr. F. Smith to be *Cryptus formosus*, Brullé, parasitical also on *Anaphe reticulata*. A number of specimens of the insect, both preserved and alive, were exhibited.

Mr. Rutherford also exhibited a series of colour-varieties of an African butterfly, viz. *Aterica Meleagris*, Cram., as illustrative of the principle of protective assimilation. He remarked that all the species belonging to the genus *Aterica* were shade-living and extremely local in their habits, with the solitary exception of *Meleagris*, which he had never found in shady places, but always in bright sunshine. He had never observed it settle on leaves, but always on the ground, and with closed wings, the under side of which have such a resemblance to the colour of the soil that he had always experienced the greatest difficulty in detecting the butterfly when at rest. That this was no mere chance resemblance was evident from the nature of the illustrations exhibited. Thus, the under sides of the wings of two examples from Senegambia were of a dull brown colour, the soil of that region consisting of reddish sand and ferruginous clay, while specimens from Calabar and Camaroons had their under sides coloured light brown, with numerous small white spots, the soil of these countries being composed of light brown clay and small quartz pebbles. Similarly, examples from Natal and the Mozambique coast approached in colour those of Senegambia, that of the soil being nearly the same. Specimens taken at Magila, in the Ussambara country, were of two varieties, one of a dull red colour, that of the soil, and the other brownish, with white spots, the habit of the insect being to settle both upon the ground and also upon granite boulders, with which that region abounds. Five examples from the banks of the Atbara, in Nubia, showed all the varieties occurring in other localities, this being accounted for by the colour of the various deposits of sediment likely to be made by a river passing through such a series of geological formations as occur between Abyssinia and Nubia. It would thus appear that *A. Meleagris*, through some original resemblance in the coloration of its wings to certain conditions of soil, has been able to resist the attacks of its natural enemies, and thus, meanwhile departing from the habits of the family to which it belongs, had acquired the power of distributing itself throughout a large area of country.

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Mr. Jenner Weir considered that Mr. Rutherford's views might be extended to the colour variations of *Hipparchia semele*.

Mr. Wood-Mason referred to the many cases of protective resemblance exhibited in the *Mantidæ*.

Major Elwes considered that too much stress was laid on "protective resemblances," and from a study of the birds of Northern India, had come to the conclusion that the colour variation showed neither for nor against the theory.

Mr. Distant adduced some instances of what appeared to be protective coloration, and stated that he thought in many cases, without further knowledge, the term "assimilative coloration" would be as correct as the designation of "protective resemblance."

The President alluded to the beautiful protective adaptation of coloration in the wings of the lepidopterous genus *Kallima*.

Mr. J. Jenner Weir exhibited five specimens of *Argynnis Paphia*, which he had captured during the month of July in the New Forest, Hampshire. The first was a singular aberration of the male, having two well-defined white spots on the upper wings and two faint white spots on the lower wings; he had heard of similar specimens having been taken in former years, and one other was observed in the present year. The second was a normal specimen of the male, introduced for comparison with the third and fourth males exhibited. With regard to these two, Mr. Weir remarked that it was well known that a melanic variety of the female of *Paphia* known as *Valezina* was observed every year in the New Forest, and it appeared to him that if he carefully examined a sufficient number of males he might find some which, although not strictly *Valezina*, yet showed a tendency to melanism. After examining a large number, he found two males much darker than usual; the ground colour of the wings was redder, and the four enlarged nervures were very much more deeply edged with black. He was of opinion that these were potentially males of *Valezina*, and that from such males the female of that dark variety would be more likely to originate than from a male of the ordinary colour. The fifth, specimen was a true *Valezina*, and he remarked that this year *Argynnis Paphia* was unusually scarce, yet the proportion of *Valezina* was much greater than usual; certainly not less than ten per cent. of the females were so coloured, the usual proportion not being greater than about one per cent. He had himself captured eleven *Valezina*, and had seen three others, and he had not altogether seen one hundred and forty females, if so many. Mr. Weir was confident that the melanism extended to a great extent over the whole of a brood, as eight of those taken were found within a few yards of each other; and in another spot he and his friends had captured fourteen within a short distance of each other; at the same time none were seen in other woods where the species was common. It might

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perhaps be argued that the melanic variety was confined to particular woods, but such did not appear to be the case, as in spots where he and his friends had seen *Valezina* in former years none were to be found this year. The female of *Argynnis Paphia* when startled usually flies up into a neighbouring tree, and does not wander about, as does the male. He had seen a female in the act of oviposition, and each egg was laid singly low down in the moss-covered stem of the oak; but as far as he was able to judge, all the eggs were deposited within a few yards of each other.

The President remarked that some seasons were probably more favourable than others for the production of dark *Paphias*, still the dark forms might make a new subspecies.

Papers read.

Mr. J. Wood-Mason read a paper "On the Difference between the form of the Antennæ in the Males of *Idolomorpha* and other Genera of *Empusidæ*, a Subfamily of *Mantidæ*."

Mr. Dunning read a paper "On the Genus *Acentropus*."

Papers were also contributed by Mr. Butler, "Descriptions of several new Species of Myriopoda of the genera *Sphærotherium* and *Zephronia*," and by Mr. Baly, "Descriptions of new Genera and Species of South American *Eumolpidæ*, chiefly from the Amazon Region."

New Part of 'Transactions.'

Part II. of the 'Transactions' for 1878 was on the table.

September 4, 1878.

Frederick Smith, Esq., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Election of a Member and Subscriber.

Mr. David Price, of West Street, Horsham, Sussex, was ballotted for and elected an Ordinary Member. Capt. Thomas Broun, of Whangarei Heads, Auckland, New Zealand, was ballotted for and elected a Subscriber.

Exhibitions, &c.

Mr. D. G. Rutherford exhibited two specimens of an Orthopterous insect, *Palophus Centaurus*, Westw. (originally described from Old Calabar), taken on Mount Camaroons, at an elevation of 6000 feet. The species is nocturnal in its habits, and is remarkable on account of its very perfect resemblance to the twigs of the tree which it frequents.

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Mr. Meldola stated that, while on the subject of protective resemblance, he would remark with reference to Mr. Rutherford's exhibition of *Aterica Meleagris*, made at the last meeting, and Mr. Jenner Weir's suggestion that a similar mode of variation might be found to hold good in *Hipparchia Semele*, that having recently obtained a long series of this last butterfly from the sand-hills at Southport, in Lancashire, he had compared the under sides with those of a series from the chalk at Caterham, but no perceptible difference of colour could be observed.

Mr. Weir remarked that he had detected in a British collection some specimens of *H. Semele* which had been taken in Jersey, and that these were darker than specimens from the chalk. With regard to moths, he stated that it was well established that certain species, such as *Gnophos obscurata* and *Eubolia bipunctata*, exhibited a tendency to local variation in colour.

Mr. W. C. Boyd stated that he had observed specimens of *Hepialus lupulinus* from Margate to be whiter than usual.

Mr. F. Smith exhibited a specimen of the so-called "locust-tree" (*Hymenea coubaril*), from British Guiana, forwarded to Dr. Sharp by Mr. Harper. On opening the fruit it was found to contain three living specimens of a weevil (*Cryptorhynchus stigma*, Linn.), a cocoon containing the chrysalis of a moth, together with the remains of one or more such cocoons, and lastly a small parasitic hymenopteron (an ichneumon allied to *Chelonus*). The small puncture by which the eggs of the weevil were probably introduced could be seen in the shell of the nut, but no trace of any other opening. Mr. Smith also stated that Mr. Harper was taking steps to secure information concerning the curious "trap-door bee," the habits of which had formed the subject of an article in 'Household Words' many years ago (vol. ii., p. 353).

Mr. Smith likewise exhibited a specimen of *Melolontha vulgaris*, which had quite recently been found alive under turf at the bottom of a tin box in which the larva had been placed last April, thus making it appear probable that this insect assumes the perfect state under ground a long time before making its actual appearance.

Mr. G. C. Champion exhibited a series of *Spercheus emarginatus* taken at West Ham, Essex.

Mr. John Spiller, who was present as a visitor, exhibited some seeds which, when first received, had the peculiar property of jumping about, and read the following note concerning them:—

"The 'jumping seeds' were in full activity at the time of coming into my possession in 1871, and continued to exhibit their remarkable movements for a period of at least three months. They were publicly shown at one of a course of lectures on magic delivered at the London Institution in January, 1872, by the late Mr. John Cargill Brough. The seeds resemble

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in appearance those of a convolvulus, rather large in size, and enclosing the larvæ, to the movements of which the jumping action is ascribed. When placed in the palm of the hand or taken into a warm room they became very lively and travelled considerable distances, hopping about almost like cheese-maggots. In neither of the two seeds shown did the larva undergo further development, but I have been favoured with some interesting particulars by Mr Charles Breach, of Oxford Road, Chiswick, from whom I received these curious specimens.

"A parcel of them came over from Mexico in 1871, having been collected by Indian children on the mainland east of the Gulf of California and near the town of Alamos. When first received the paper-bag was opened overnight and left on the table, but by the next morning the seeds had mostly escaped and were found distributed about the floor of the room. A good many were given to friends, but those which Mr. Breach reserved for himself were kept in a tin case, and when this was opened some months later a number of small moths flew out, but it is to be regretted that none of these were preserved. They are said to have been about five-eighths of an inch long and dark grey in colour. Mr. Breach assumes that the eggs were deposited in the seed-vessel of the flower and subsequently became enclosed, the young larvæ boring into the seeds as they ripened. The weight of the seeds in their present condition is rather less than one grain and a half each."

Mr. S. Stevens stated that he had possessed some of the "jumping seeds," and had bred the moths from the enclosed larvæ, which had turned out to be a species of Tortrix, *Carpocapsa saltitans* (see also Trans. Ent. Soc., 2nd series, vol. v., p. 27).

The Secretary exhibited a photograph of *Prodryas Persephone*, Scudder, a fossil butterfly in a wonderfully perfect state of preservation, found in the tertiary formations of Colorado. The photograph had been forwarded to the Society by Mr. Scudder.

Mr. F. Smith stated that having recently had occasion to refer to the Linnean Collection in the apartments of the Linnean Society at Burlington House, he much regretted to find that this invaluable collection, containing a large number of the original type-specimens of that illustrious naturalist, had been allowed to fall into a state of complete neglect, and after consulting with the Council he had thought it advisable to mention the fact to the Members of the Entomological Society, in order that the Society, through the Council, might take immediate steps to secure the future preservation of the collection. The motion was then formally put to the meeting and carried unanimously.

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Papers read.

Mr. A. H. Swinton communicated a paper "On the Vocal Music and Wing-beating of Insects."

Mr. C. O. Waterhouse read a paper entitled "Notice of a small Collection of Coleoptera from Jamaica, with Descriptions of New Species from the West Indies."

October 2, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Election of a Member and Subscriber.

Mr. Thomas Nottidge, of Ashford, Kent, was ballotted for and elected a Member. Mr. J. Lawrence Hamilton, M.R.C.S., of 34, Gloucester Terrace, Hyde Park, was ballotted for and elected a Subscriber.

Mr. F. Smith stated that since the last meeting of the Society, when he had informed the Members that, in his opinion, the Linnean Collection in the apartments of that Society at Burlington House had been allowed to fall into a very neglected condition, he had brought the subject under the notice of Sir John Lubbock, who had agreed that if such was the case the collection should at once be seen to, and immediate steps taken for its future preservation. In order to effect this, Sir John Lubbock had, with Mr. Smith's permission, forwarded the letter in which the subject had been mentioned by Mr. Smith, to the President of the Linnean Society, who had promised that the Collection should be at once attended to. This being the case, Mr. Smith did not think that it would be necessary for the Council or Members of the Entomological Society to take any further steps in the matter.

Mr. M'Lachlan then read the following

Report on the Linnean Collection.

"I have heard, with not less astonishment than regret, that at the last meeting of this Society (at which I was not present), held on the 4th ult., a resolution was passed which virtually amounts to a vote of censure on those officers of the Linnean Society who have charge of the so-called Linnean Collection of Insects.

"Upon the testimony of Mr. Frederick Smith, Vice-President of this Society, and chairman at the meeting above mentioned, it was decided that

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the collection had been allowed to fall into a state of complete neglect, and that immediate steps be taken to remedy such a state of affairs. The meeting in question was held at a time of year when few members are in town, and, so far as I know, Mr. Smith was the only one present who has had occasion to consult the collection. It has been to me a painful duty (from causes I refer to lower down) to have to study a portion of the collection many times during more than fifteen years, and I visited it only a few months ago. Therefore, as an old member both of this and the Linnean Society, I considered it my duty to make an independent attempt to reconcile Mr. Smith's statement with my own previous experience, which was utterly opposed to his, as set forth in the reasons upon the strength of which the resolution was passed. I examined, two days ago, nearly the entire collection, and saw nothing whatever to justify the step taken by this Society. I believe the collection is in the same condition as it has been for probably a quarter of a century. There are not the slightest signs of *Acari*, *Psoci*, or *Anthreni*, and, in this respect, it will compare favourably with the collections possessed by most of us. There are, here and there, and especially in one or two drawers of Hymenoptera (the only portion of the collection inspected, as I am informed, by Mr. Smith), traces of mould, and, in some cases, of recent growth, but only to an extent that the application of a brush would at once remove it, and suffice for the most minute examination of external structure. I have stated that the 'mould' appeared to be recent, but I do not wish to infer thereby that the predisposing causes have been equally recent. Mr. Smith cannot be ignorant of the fact that the spores of the Fungi producing what is commonly known as 'mould' may rest dormant for several years, until some exciting cause force them into activity. In my own experience I have had painful proof of this. Some specimens obtained from a certain old collection would occasionally show signs of 'mould,' although placed under the same conditions as a multitude of others not affected in any way; and at last I think a cure was affected by the application of an arsenical solution. I mention this because I feel sure that the traces of fungoid growth noticed by me do not result from recent neglect.

"And this brings me to a point at which it is advisable to touch upon the history of the Collection and its present scientific value. We all know that the unworthy son of an immortal father allowed, from sordid reasons, the collection formed by Linné to pass out of his native land. We all know that the Swedish Government (becoming too late aware of the treasure they were losing) sent a frigate after the vessel conveying the collections to England, but in vain. Now, supposing these collections not to have been tampered with by the younger Linné (of which there is no proof), the fact that they ever left the shores of Sweden cannot be sufficiently deplored. As you all know, they came into the possession of Sir J. E. Smith, a

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botanist of renown, and I believe the botanical portion was religiously respected by him. Not so the entomological. Sir J. E. Smith had himself a collection of insects (mostly British), and these were added. Furthermore, there is evidence that the labels on the insects, even if in what is believed to be Linné's own handwriting, are not to be relied upon, and there is strong reason for supposing that Sir J. E. Smith (or possibly some early officer of the Linnean Society) applied certain labels to better examples of what were supposed to be the same species, destroying the (probably mutilated) originals. Such a supposition is warranted in the case of some specimens in the groups in which I am especially interested.

"Of the history of the early years of its actual possession by the Linnean Society little, I think, is known. As to its later history, I can confidently affirm that it has been most carefully attended to. Its scientific value (I speak now, as always, only of the insects) is quite another matter. The amount of evident tampering is so great as to induce me to think it might be an absolute benefit to science if it were destroyed, so great is the danger that students, not thoroughly acquainted with its history, take for granted that the fact of a label in Linné's handwriting attached to a particular specimen entitles that specimen to be considered a 'type.' It can only be so regarded if the original description and collateral circumstances favour such an idea, and any value the collection may now possess can only remain if it be studied in conjunction with Linné's own annotated copies of his works, and those of other authors in his Library, in the possession of the Linnean Society.

"In conclusion, it appears to me that the more generous course for Mr. Smith to have pursued would have been to postpone action until some other members of this Society were present capable of appreciating the subject, or in the first instance to have communicated privately with the Librarian, or some member of the Library Committee of the Linnean Society which is responsible for the welfare of the collection."

Mr. Stainton stated that he could fully endorse the conclusions which had been arrived at by Mr. M'Lachlan, as he had examined the collection on the previous day, and had not been able to detect any appreciable deterioration in it since the year 1848, when he first had occasion to consult it. Mr. Stainton further remarked that if Mr. Smith's examination had led him to an opposite conclusion he had undoubtedly adopted the proper course in bringing the matter under the notice of the officials of the Linnean Society.

Exhibitions, &c.

Mr. Jenner Weir exhibited specimens of *Hipparchia Semele* from the New Forest, Lewes, the Rigi, and Russia, showing a tendency to vary in

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colour on the under side in accordance with the nature of the soil of the district in which the specimens had been taken.

Mr. M'Lachlan exhibited the eggs and young larvæ of *Ascalaphus longicornis*, found by Mons. E. L. Ragonot in the Forest of Lardy, not far from Paris, apparently the northern limit of distribution of the species. The eggs were arranged, after the manner peculiar in the family, in two rows on a dried grass stem, to the number of forty-six or twenty-three in each row. He had some of the young larvæ still living, but was uncertain as to whether he would be able to rear them.

Mr. M'Lachlan also exhibited, on behalf of Mr. Edwin Birchall, a much-worn example of *Heliothis scutosa*, which had been captured by Mr. W. H. Campbell, of Londonderry, in the north of Co. Donegal, Ireland, on the 19th August last. He alluded to the sporadic habits of this and allied species, and its rarity in the British Islands.

Mr. Rutherford exhibited, and communicated a description of, a new species of Goliath beetle, from Mount Camaroons, allied to *Ceratorrhina Sayi*, Westw. He also exhibited a specimen of a West African butterfly, *Romaleosoma Ruspina*, Hew., nearly a third of the wings of which, on both surfaces, along their outer margin, and beginning a little below the apical angle of the primaries, were entirely destitute of scales, with the exception of the nervures, which were sparsely covered with them. The symmetry of the transparent portion of the naked wings seemed, he thought, to preclude the idea that the butterfly had been partly denuded of its scales, either intentionally or by accident; and he inclined to the conclusion that the appearance it presented was due to some abnormal physiological condition occurring either in the larva or chrysalis.

Mr. G. C. Champion exhibited specimens of *Amara infima*, from Chobham, Surrey, this rare insect not having been recorded since 1857, when Dawson first added it to the list of British Coleoptera.

Mr. W. A. Forbes exhibited a collection of insects from Switzerland, taken at the latter end of June in a valley in the neighbourhood of Chamouni, at an elevation of 5000 or 6000 feet.

Papers read, &c.

Mr. D. G. Rutherford communicated a "Description of a new Goliath Beetle from Tropical West Africa." The insect had been named *Ceratorrhina Batesii*.

Mr. J. Wood-Mason read a note "On a Saltatorial *Mantis*," and exhibited a specimen of the insect, which had been captured on the banks of the Tagus. He also read notes "On the hatching period of *Mantidæ* in Eastern Bengal," and "On the presence of Stridulating Apparatus in certain *Mantidæ*," this being the first discovery of such an organ in that family. The author exhibited, in illustration of the last note, a large *Mantis*, showing

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the serrated fore margin of the tegmina by means of which the stridulation is effected.

Mr. Wood-Mason also stated that it might interest the members of the Society to hear that in the course of his anatomical work he had discovered a remarkable case of viviparity in the Orthoptera, in a large cockroach belonging to the genus *Panesthia*, the species of which inhabited the tropical forests of Southern Asia and of Australia, where they lived in the rotten wood of fallen trees. The species in question was *P. Javanica*, from the abdominal brood-pouch of the female of which he had extracted young white specimens of 6·5 mm. in length, and these, from their being already provided with legs, antennæ, black eyes, and the full number of already hard-tipped gnathites, as well as from their size, he judged were just on the point of birth when the mother was thrown into the alcohol. He further suggested that the curious and as yet unexplained habit evinced by several European species of *Blattidæ* of carrying their egg-capsules about with them for a week, or even for so long a period as a fortnight, before depositing them, might possibly be explicable as the retention of a vestige of a lost viviparity.

November 6, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

Exhibitions, &c.

Mr. F. Smith called attention to a passage in Mr. M'Lachlan's "Report on the Linnean Collection," read at the last meeting (*vide* also Ent. Mo. Mag. for November, p. 140), wherein the author states, as the result of his examination of the collection, that "there were no traces of mites, *Psoci*, or *Anthreni*." Mr. Smith was of opinion that this statement might lead to the belief that he had affirmed that the collection was actually attacked by mites, *Psoci*, and *Anthreni*, and as this was not the case he mentioned the subject in order to remove any erroneous impression.

Mr. C. O. Waterhouse exhibited a specimen of *Chauliognathus excellens*, a new beetle from the United States of Columbia.

Mr. H. T. Stainton exhibited a new horn-feeding *Tinea* reared from horns from Singapore, *T. orientalis*, allied to the well-known large species from South Africa, of which the larvæ fed in the horns of living buffaloes and antelopes, and which had been described by Zeller under the name of *Vastella*, and subsequently by himself under the name *Gigantella*, both

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names referring to the extraordinary size of the insect in the genus *Tinea*. The specimens now exhibited were reared by Mr. Simmons, of Poplar, who found them in his greenhouse, and was quite at a loss to account for their appearance till Mr. Stainton suggested they were horn-feeders, when he remembered a piece of horn placed on a shelf and forgotten, but which when examined showed evident traces of having been eaten, and from which pupa-skins had been obtained.

The Rev. H S. Gorham exhibited the following rare beetles, taken in the neighbourhood of Horsham, Sussex:—*Platypus cylindrus*, Fab., *Lathrobium pallidum*, Nordmann, *Achenium humile*, Nicolai, and *Cryphalus abietis*, Ratzeburg. [Coloured figures of the three first named will be found in Janson's 'British Beetles,' figs. 99, 112, 113.]

Mr. H. Goss exhibited male and female specimens of a rare dragon-fly, *Cordulia Curtisi*, taken at Popesdown, Christchurch, Hampshire. Mr. M'Lachlan made some remarks on the geographical distribution of this species. (See also Ent. Mo. Mag. for Sept. 1878, p. 92.)

Mr. Meldola exhibited a male specimen of a moth from Jamaica, belonging to the genus *Erebus*, and which was remarkable on account of its possessing large scent-fans or tufts on the hind legs. Although the function of these tufts had only recently been made known through the researches of Fritz Müller, this species had been named *E. odorus* (*Phalæna-Bombyx odora*) by Linnæus. (See also Sloan's 'Jamaica,' vol. ii., p. 216).

Mr. J. Wood-Mason exhibited specimens in alcohol of *Gongylus trachelophyllus*, Burm. (male and female), and of *G. gongylodes*, Linn. Saussure was of opinion that the former species was a variety of the latter, but Mr. Wood-Mason, after examining numerous specimens of both, had found good characteristic differences, and concluded that they were specifically distinct—a view which was corroborated by the difference in the colour of the under side of the prothoracic expansion, a distinction which he had long suspected, but of which he had only recently obtained good evidence. Knowing that Sir Walter Elliot, during his long residence in India, had superintended the execution, by native artists, of a multitude of coloured drawings of animals belonging to all groups, and thinking it probable that there might be amongst these some coloured sketches of *Gongylus*, he applied to him for the loan of any drawings of Orthoptera he might still have in his possession, a request to which Sir Walter Elliot, with his usual generosity, at once acceded. Amongst these Mr. Wood-Mason had found a coloured drawing of the under surface of *Gongylus gongylodes*, which conclusively proved that the insect is coloured so as to resemble a flower with a *white* corolla, thus differing remarkably from the other species, in which the prothoracic shield is of a pale bluish violet inclining to mauve, and acquiring a reddish tinge towards the margins. Both species have the same black-brown transverse prosternal blotch. *G. gongylodes* was restricted

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in its distribution to the neighbourhood of Bangalore in Mysore and Ceylon; one specimen, however, is in the National Collection from the Dharwar district South Mahratta country, obtained many years ago by Sir Walter Elliot himself. *G. trachelophyllus*, on the other hand, was only known to Mr. Wood-Mason from Midnapur, from the base of the Karakpur Hills near Monghyr. In 1871 he had received a specimen from Pegu, which was obtained by the late Mr. S. Kurz during a botanical tour in that province. This specimen differed but slightly from the typical form, the colour of the prothoracic shield being a bright blue-violet, and its resemblance to a flower deceived for the moment the practised eyes of Mr. Kurz. Mr. Wood-Mason hoped before long to be able to give coloured figures of these anthomimetic *Mantidæ*.

Mr. W. L. Distant stated that Waterton recorded in his 'Essays on Natural History,' the resemblance of the rattle of the rattlesnake to an orthopterous insect, and suggested that this, by deceiving and attracting birds, might be of service to the reptile in the same manner that the floral resemblance of *Gongylus* serves to secure for these insects a supply of food.

Mrs. Randolph Clay (who was present as a visitor) exhibited a living specimen of *Zopherus Brêmei*, from Yucatan, Mexico, which had been worn by her for many months as an ornament, during which time the insect was stated to have taken no food. (See also 'The Queen,' 24th August, 1878.)

Sir Sidney Saunders exhibited specimens of *Blastophaga Psenes*, Linn., male and female, employed in the process of caprification, received from M. Jules Lichtenstein, of Montpellier. Also specimens of *Sycophaga crassipes*, Westw., from the Sycamore figs of Egypt, together with certain apterous associates corresponding with *Apocrypta* of Coquerel (but specifically distinct) recently found in the same figs.

The Secretary read a Report from Her Majesty's Consul at Taganrog, which had been sent to the Foreign Office and transmitted to the Socicty through the Board of Trade. The Report related to the destruction of the corn crops by *Anisoplia austriaca* in the neighbourhood of Myriapol, and in various districts in Berdiansk, Kharoff, Poltava, Ekaterinoslaff, Kherson and Bessarabia. *Cleonus punctiventris* and *Anisoplia crucifera* were also reported to be spreading in the provinces of Kiero and Podolia. The total damage done by these destructive Coleoptera is estimated at two million roubles. A Sub-Committee was appointed to draw up some observations on these beetles for the use of Her Majesty's Consul.

Papers read.

Miss E. A. Ormerod communicated a paper "On the Prevention of Insect-injury by the use of Phenol Preparations," and exhibited drawings and specimens showing the destruction of carrot crops by *Psila rosæ*.

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Sir Sidney Saunders communicated a paper "On the Habits and Affinities of *Sycophaga* and *Apocrypta* of the Hymenopterous family *Agaonidæ*, with description of a new species of Apocrypta from the figs of *Ficus Sycomori* of Egypt."

Mr. C. O. Waterhouse communicated "Descriptions of new *Telephoridæ* from Central and South America."

Mr. W. L. Distant communicated "Descriptions of new Species of Hemiptera-Homoptera."

New Part of 'Transactions.'

Part III. of the 'Transactions' for 1878 was on the table.

December 4, 1878.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the donors.

The President read a list of the Members of Council and Officers recommended for election at the Annual Meeting.

Election of a Member and Subscriber.

Mr. T. P. Newman, of 7, York Grove, Peckham, was ballotted for and elected a Member. Mr. J. Walker, R.N., of Blue Town, Sheerness, was ballotted for and elected a Subscriber.

Exhibitions, &c.

Mr. H. T. Stainton exhibited a series of fine specimens of *Glyphipteryx Schœnicolella* taken by Mr. Threlfall near Witherslack last summer. They were flying over cotton-grass in little swarms just before sunset—literally by hundreds—and were mistaken at the time for *G. Fischeriella*. The species was first recorded by Mr. Thomas Boyd in the 'Entomologists' Weekly Intelligencer,' vol. iv., p. 144.

Mr. Wood-Mason exhibited and made remarks upon a stridulating beetle belonging to the *Rutelidæ*.

Prof. Westwood exhibited a male specimen of *Epinephele Tithonus* having the right hind-wing much paler than the general ground colour of the other wings; likewise a variety (gynandromorphic) of *E. Jurtina*, viz., a male specimen, having the under side of the left hind-wing partly male and partly female in character, the two portions being separated by an orange streak, and presenting the appearance of a male wing with a portion of a female wing let in. An enlarged coloured diagram of the last insect was exhibited, and also similar diagrams of the following specimens:—

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1. A male *Perrhybris Pyrrha* (from Mr. Hewitson's collection) having the under side of the right hind-wing coloured like the female, which mimics a species of *Heliconia*.

2. A specimen of *Nymphalis Populi* with larval head.

3. A specimen of *Dytiscus marginalis* (original in British Museum) with larval head, and one of *Helophilus pendulus* similarly deformed, two specimens of this last example of imperfect development being in the Hope Collection at Oxford.

Prof. Westwood remarked with regard to monstrosities that although in such cases among the higher animals the head parts often appeared duplicated, this very rarely appeared among the Arthropoda. He was inclined to regard gynandromorphism as the result of the coalescence of two ova in the female insect, and the subsequent suppression of all the characters of the one sex but those retained in the imago.

Mr. H. T. Stainton raised the question whether many cases of gynandromorphism might not be explained by atavism, *i.e.*, by partial reversion to ancestral characters.

Mr. M'Lachlan exhibited a series of cases of the larvæ of Trichopterous insects forwarded to him by Dr. Fritz Müller, of Blumenau, Santa Catharina, Brazil. Several of the forms, of minute size, were evidently those of *Hydroptilidæ*. Another form was in black, slightly curved, tapering tubes of horny texture, and pertained to *Setodes* or something allied thereto. Another (of uncertain location) of considerable size was composed of nearly entire small leaves arranged longitudinally. Lastly, there was one, composed of pieces of leaves, which Dr. Müller stated had the peculiar habit of occurring on trees in the water that collects between the leaves of *Bromeliæ*, in which tadpoles, the larvæ of dragon-flies, and other aquatic animals were also to be found. In connection with this latter habit Mr. Bates informed him that rain-water collects at the bases of the leaves of these plants and remains there for nine months out of the twelve. There was also a photograph of a number of cases stated by Dr. Müller to belong to some species of *Hydropsychidæ*, of which the larvæ "make a funnel-shaped entrance to their houses with a net of which no spider need be ashamed." Generally many of them build close together, so as to intercept anything eatable which may come down the rivulet. Concerning some other cases which Dr. Müller referred to the Trichoptera, Mr. M'Lachlan was doubtful if such was their true position.*

The Rev. A. Eaton suggested that they might possibly belong to the Diptera, the larvæ of some aquatic species of which were known to manufacture somewhat similar cases.

* A more detailed account of these and some other cases of caddis-flies will be published by Dr. Müller in the 'Archivos do Museo Nacional de Rio de Janeiro.'

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Dr. Fritz Müller also sent enlarged outlines of the neuration of various Lepidoptera, in order to point out the homologies that appeared to exist with that of the Trichoptera, of which an outline of the wing of *Glyphidotaulius*, copied from Kolenati's 'Genera et Species Trichopterorum,' was placed side by side with those of the Lepidoptera. Mr. M'Lachlan called especial attention to the neuration of *Castnia Ardalus* as delineated by Dr. Müller, and compared it with that of *Hydropsyche* as figured in his 'Revision and Synopsis of European Trichoptera.' He stated that it had long been his opinion that in a linear arrangement the orders Lepidoptera and Trichoptera should not be widely separated.

Mr. Stainton called attention to the great resemblance existing between the neuration of *Micropteryx* in the Micro-Lepidoptera and that of certain Micro-Trichoptera.

Prof. Westwood was not convinced of the existence of that amount of homology insisted upon by Dr. Fritz Müller and the preceding speaker, and said that it was desirable that the supposed homologising nervures should be coloured, so as to be more readily traceable.

Mr. Wood-Mason asked Mr. M'Lachlan whether he had noticed any homology between the maxillæ of Lepidoptera and Trichoptera. The latter stated in reply that there was considerable resemblance in the form of the maxillary palpi of *Micropteryx* and some other Micro-Lepidopterous genera and those of Trichoptera, especially in the excessive development of these palpi as compared with the labial, these latter being usually the most prominent in Lepidoptera.

The Rev. A. Eaton exhibited a piece of "Kungu cake" from Lake Nyassa. According to Livingstone and others this substance is used extensively as food in the region referred to, and is made by the natives of large quantities of a minute insect, whose habit is to fly in dense cloud-like flights often similar in appearance to columns of smoke. These subsiding upon the herbage along the borders of the lake accumulate to a considerable depth, and are then collected *en masse*, pressed into cakes, and dried for consumption. Until now the "Kungu fly" has been conjectured to be a species of the *Ephemeridæ*; but on actual inspection it proves to be a minute representative of the *Culicidæ*, and (so far as can be ascertained from the material at hand) of the genus *Corethra*. Its wing measures 2·5 mm. in length. Drawings of details accompanied the specimen. These are intended for publication in an account of Capt. Elton's journey from Lake Nyassa to the north-eastward, which is in the press, the specimen exhibited having been entrusted to Mr. Eaton by the editor of this work, the Rev. H. Waller, of Tywell. The condition of the compressed examples precludes an exact determination of the species being made from them. It is possible that "Kungu cake" in other localities may be composed of other materials.

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Mr. W. L. Distant remarked that he had learnt from Mr. Chennell that *Erthesina fullo*, a very common Eastern Hemipterous insect, was largely eaten by the Naga Hill tribes of N E. India.

Mr. Meldola stated that while on the subject of insect-food he would mention that Mr. S. Stevens had forwarded to him a query by Mr. J. Watson respecting the chemical composition of the bodies of insects, which, since they furnish all the materials necessary for the food of those birds that, like swallows, feed on the wing, must contain, in addition to carbon, hydrogen, and oxygen, the requisite nitrogen and phosphates. Mr. Meldola remarked that chitine, the substance composing the horny external portions of the bodies of insects, had been shown by analysis to contain about 6 per cent. of nitrogen. With regard to phosphates he stated that, although he was sure the ash of the bodies of insects did contain these salts, he was unable to find any direct statement to this effect, and at his request, therefore, Mr. William Cole had been good enough to burn some insects, and to test the ash for phosphoric acid, which he had succeeded in finding.

Mr. C. O. Waterhouse forwarded for exhibition a living *Curculio* found by Mr. J. C. Bowring in his orchid-house at Windsor. The insect was identified by Mr. Pascoe and Professor Westwood as one of the *Calandridæ*.

The Secretary then read the following:—

Report of the Sub-Committee appointed to consider the communication from the Board of Trade, dated 2nd November, 1878, *regarding the ravages of* Anisoplia austriaca *at Taganrog.*

"We have investigated the matters referred to in the official correspondence placed in our hands, and report thereon as follows:—

"The insect *Anisoplia austriaca* belongs to a group of beetles (*Rutelidæ*) allied to our common cockchafer, but is of very much smaller size. We have been unable to find any record of the complete Natural History (*ab ovo*) of this, or any very closely allied species. There can be no doubt, however, that the eggs are deposited in the earth at the roots of corn or grasses, that they soon hatch, and that the larvæ feed upon the roots. How long a period elapses before the pupal state is assumed we know not. In the cockchafer three years are stated as the usual time. In the smaller species we think that two years may be the outside limit; and that in the autumn of the second year of its existence the larva either forms a cocoon, in which it remains quiescent until the following spring, when it assumes the pupal state, or, as is more probable, it assumes that state in the autumn, and the perfect insect may be developed soon afterwards, but remains in the cocoon until the following summer.

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"All accounts, however, we have been able to refer to concerning this and congeneric species agree (as does the information furnished by Mr. Carruthers) in attributing the chief damage to the perfect insect, which feeds upon the green corn in the ear. In some parts of Germany *Anisoplia agricola* is reported to do considerable damage to rye in the same manner.

"In the year 1867 Pfarrer Josef Orth published a letter in the Hungarian 'Pester Lloyd' with reference to the appearance, in June, of extraordinary numbers of this *Anisoplia austriaca* in the Banate, a Danubian province of Hungary; and his letter is reproduced and commented upon by Herr A. von Pelikan in the article entitled "Ueber Getreide-Verwüstunzen durch *Anisoplia*," published in the 'Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien,' vol. xvii. (1867), pp. 693—696.

"Pfarrer Orth states that a very long cord, several fathoms long, was stretched across the field, a horse being attached to each end, and in this way the cord was drawn across the field so as to disturb the beetles from their food, which they left and flew away. In one way or other one hundred men were engaged upon this service collecting the beetles and putting them into pots, the beetles being afterwards destroyed. He enters into an elaborate calculation as to the numbers so destroyed, which he estimates at some 6,720,000 individuals.

"We think it is impossible to place too high a value upon the laborious process of destroying the perfect insects, but there are some other matters in connection with it that merit serious consideration. First, we think it highly desirable that rotation of crops (which is probably less attended to in the grain-producing plains of Southern Russia than here) should be enforced, and that it might be advisable to revert to the grain-crop only after the lapse of the second year. Secondly, we cannot place too high an importance upon the encouragement of insectivorous birds, such as Rooks, Starlings, &c. If such birds be allowed unrestricted access to newly-ploughed fields which have been recently under grain, they will probably effect more good in a few days by destroying larvæ and pupæ than could possibly be done by collecting the perfect insects. Finally, we believe there is no reason to apprehend the recurrence year after year of such multitudes of the beetles.

"Pfarrer Orth (in the letter above quoted) says it is always present in the Banate, but only sparingly in moist seasons, and he does not appear to have had any former experience similar to that of 1867. In the present state of entomological science it is impossible to accurately account for visitations like this, which occur with many insects, injurious or otherwise. It may be that the pupal condition is prolonged indefinitely, or until circumstances favour its determination: by this reasoning (which is warranted by

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what we know to be the case in some other insects) the pupæ might be accumulated from year to year, and the perfect insects from these accumulations burst forth simultaneously.

(Signed) R. M'Lachlan, F.R.S.
Chas. Owen Waterhouse.

December 4th, 1878."

Paper read.

Mr. A G. Butler communicated a paper "On a collection of Lepidoptera from Cachar, N.E. India."

ANNUAL MEETING,

January 15, 1879.

H. W. Bates, Esq., F.L.S., F.Z.S., President, in the chair.

Mr. J. W. Dunning, one of the Auditors, read an abstract of the Treasurer's Accounts for 1878, showing a balance of £30 14s. 7d. in favour of the Society.

The Secretary read the following:—

Report of the Council for 1878.

The Council, in accordance with the Bye-Laws, begs to submit the following Report;—

During the year 1878 the Society has lost four Members by resignation and two by death, while fourteen new Members and Subscribers have been elected. The losses by death are Mr. William Chapman Hewitson, the well-known Lepidopterist, and Mr. T. W. Wonfor, Curator of the Brighton Free Library and Museum.

The 'Transactions' for 1878 (exclusive of the 'Proceedings') form a volume of 335 pages, containing six plates, of which two are coloured. Although the volume is smaller than that of last year, it again shows a favourable increase in the number of memoirs, of which it contains thirty-one, many of them being of wide biological interest. In our 'Journal of Proceedings' will likewise be found recorded many valuable communications and discussions.

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With respect to finances, the Council has the satisfaction of stating that the Society's income for the year has been sufficient to meet the expenditure. The following is an abstract of the Treasurer's account:—

Receipts.		Payments.	
Balance in hand	£10	Rent, Office, and Meeting Expenses	£112
Contributions of Members	207	Publications	173
Sale of Publications	77	Library	13
Interest on Consols	9		
Donations	25		
	£328		£298

During the year thirty-one town Members have availed themselves of the regulation by which, on extra annual prepayment of half-a-guinea, they become entitled to the 'Transactions' for the year free by post. In 1876, when this bye-law was passed, twenty-eight Members subscribed, and in 1877 there were twenty-four subscribers, so that the past year shows an increase which may be considered as an acknowledgment on the part of the Society of the advantages thus held out.

As will be seen on reference to the published list, the Library has received a large number of donations. The Society is indebted to Mr. J. W. Dunning for a copy of Dr. Herrich-Schäffer's 'Die Schmetterlinge von Europa,' a work in six vols., quarto, with many valuable plates.

The Librarian reports that greater use has been made of the Library during the past year than the preceding one, 131 volumes having been borrowed. Thus the advantage arising from the operation of the bye-law which made the Library daily accessible to Members is once more forcibly confirmed.

In conclusion, the Council has the satisfaction of pointing to the increasing interest in the meetings evinced by our Members and their friends, the attendance-list showing that the twelve ordinary meetings held during the year 1876 were attended by 322 Members and Visitors, while at the same number of meetings during 1877 there were 334 attendances, and during the past year there were 341 attendances.

11, Chandos Street, Cavendish Square, W.
January 15th, 1879.

Mr. M'Lachlan proposed and Mr. Wood-Mason seconded the adoption of the Council's Report. The motion was put to the Meeting and carried unanimously.

An address was delivered by the President.

Sir Sidney Saunders and Mr. E. Boscher were appointed scrutineers.

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The following Members of Council were elected for 1879:—Henry Walter Bates, F.L.S., F.Z.S.; William L. Distant; Rev. A. E. Eaton, M.A.; Edward A. Fitch; Ferdinand Grut, F.L S.; Raphael Meldola, F.C.S.; Edward Saunders, F.L.S.; Frederick Smith; J. Jenner Weir, F.L.S., F.Z.S.; Joseph W. Dunning, M.A., F.L.S.; Sir John Lubbock, Bart., M.P., V.-P.R.S ; Samuel Stevens; James Wood-Mason, F.G.S.

The following officers were then elected:—President, Sir John Lubbock, Bart., M.P.; Treasurer, J. Jenner Weir; Librarian, F. Grut; Secretaries, R. Meldola and W. L. Distant.

Mr. H. T. Stainton proposed a vote of thanks to the President for his services during the past year, and moved that his address should be printed. The motion was seconded by Mr. M'Lachlan, and carried unanimously.

A vote of thanks to the other officers for their services was proposed by Mr. J. W. May, seconded by Mr. Pascoe, and carried unanimously. Messrs. Jenner Weir, Grut, Meldola, and Distant replied.

The President returned thanks to the Auditors, on whose behalf Mr. Dunning replied, and the meeting then adjourned to February 5th.

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STATEMENT OF RECEIPTS AND PAYMENTS

From 1st January to 31st December, 1878.

Receipts.	£	s.	d.	Payments.	£	s.	d.
To Balance from last Account	9	18	1	By Rent and Office Expenses	111	10	7
Subscriptions	165	13	9	Printing	148	18	2
Admission Fees	16	16	0	Colouring, Engraving, &c.	24	3	10
Arrears	25	4	0	Binding Books	6	4	0
Donations	25	3	0	Purchase of Books	6	19	11
'Transactions,' sale of, &c.	77	1	7		£297	16	6
Consols, being interest on £297 9*s.* 9*d.*	8	14	8	Balance in hand at 31st Dec. 1878	30	14	7
	£328	11	1		£328	11	1

Liabilities to date.	£	s.	d.	*Assets.*	£	s.	d.
Printing Part IV.	24	7	0	Consols	297	9	9
				Arrears (say)	10	10	0

Audited and found correct, { J. W. Dunning. Wm. Cole. Edward A. Fitch.

J. JENNER WEIR, *Treasurer.*

January 8, 1879.

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THE PRESIDENT'S ADDRESS.

GENTLEMEN,

In accordance with time-honoured custom in this and other Scientific Societies of the metropolis, I commence the Presidential Address of the year with a brief notice of the lives and labours of those members who have been lost to us by death during the period that has elapsed since the previous anniversary. Happily the list on the present occasion is a short one; but it contains the name of one who during his life time occupied a prominent position in the Entomological world, and whose loss has created a void in an important branch of our science which is most distinctly felt. I allude to our deceased member, Mr. WILLIAM CHAPMAN HEWITSON.

Mr. Hewitson was born at Newcastle-on-Tyne in the year 1806: he was consequently seventy-two years old when he died on the 28th of May last. His health from childhood upwards was always delicate, and his later years were spent in a continual struggle with his constitutional infirmities. Yet he lived to an age which exceeded the proverbial three score years and ten, and we may be permitted to believe that the prolongation of his life and activity was in great measure due to the beneficial effects of a pursuit which affords so constant a supply of novelty and interest to keep the faculties in healthy employment. But in his case there were superadded the favourable circumstances attendant on a position of affluence, and the wise habit which he cultivated of restricting his studies and work, in extent and amount, to what he could leisurely accomplish. As is so often the case with Naturalists whose devotion to their pursuit is of life-long duration, his tastes declared themselves at an early age. He appears first to have given his principal attention to the British Lepidoptera, his name frequently occurring in Stephens' 'Illustrations,' beginning with the year 1828, in connection with

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notes of captures near Newcastle, York, &c., of butterflies and moths. The tendency of his mind then—as throughout his life—was rather in the direction of the artistic enjoyment of natural objects than their intellectual study, and of æsthetic qualities it was colour much more than form which attracted him. This peculiarity of mental character, if we apprehend it rightly, furnishes the key to the appreciation of all his subsequent work, its merits and its deficiencies. With such inclinations, it is natural that he should have been attracted in his youth by the beauty of birds' eggs, and have employed his great artistic skill in figuring them. Thus, his first published work was the well-known 'Coloured Illustrations of the Eggs of British Birds,' of which the first part appeared in April, 1831, and which has maintained its hold on public favour ever since, and reached the honours of a third edition.

At this time Mr. Hewitson was a poor man, following his profession of Surveyor, in the course of which he was employed in surveying portions of the lines of some of our great railways then in course of construction. Successive bequests by deceased opulent relatives gradually improved his position, and enabled him to indulge freely his now confirmed passion for the Diurnal Lepidoptera. In 1844 he visited Switzerland and made a collection of Alpine butterflies, an account of his captures of which appeared in the 'Zoologist' for 1845. Soon after he took up his residence at Hampstead, in order to be near the metropolis, and entered ardently into the formation of a collection of exotic butterflies. Henceforward he became a considerable purchaser of specimens from all parts of the world, and to the same extent contributed to the encouragement of the many Natural History expeditions, to various countries, which from this epoch rapidly succeeded each other. Thus he helped, with others, to render the scientific voyages of Dyson to Honduras and Venezuela possible in 1845—7, and afterwards those of Mr. Wallace and myself, commencing in 1848 and extending over a series of years. But it must be recorded that at the commencement his assistance was but sparingly rendered, and that it was only in the later years of his life that he sent out travellers at his own cost, and received as a reward of his munificence those splendid series of new and beautiful species which rendered his collection famous, and which, but for his enterprise, might have till now remained

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unknown in the shades of their almost inaccessible tropical forests.

In 1846 he commenced, with his friend Edward Doubleday, the 'Genera of Diurnal Lepidoptera,' the text of which was continued and completed by Professor Westwood after the death of Mr. Doubleday. This grand work, no doubt, gave a great stimulus to the scientific study and the collection of this group of insects—a stimulus which was continued by its immediate successor, the 'Illustrations of Exotic Butterflies,' undertaken by Mr. Hewitson as sole author in 1851. In this latter work the great defect of the 'Genera"—the absence of figures of under sides —was avoided; but the exquisite beauty and fidelity of colouring and outline were maintained and even improved upon. The work was continued in quarterly parts with great regularity for twenty years, terminating with its fifth volume in 1871. The drawings were all made on the stone, and the pattern coloured by the author himself, great pains and expense being employed in keeping up a high standard of workmanship on the part of the colourists. Long before the completion of this *chef d'œuvre*, he commenced another similar work, devoted to the family *Lycænidæ*, entitled 'Illustrations of Diurnal Lepidoptera,' the first part of which appeared as the commencement of an illustrated catalogue of the family, published by order of the Trustees of the British Museum, but which these authorities declined to continue. Of this seven parts were successively published, the work remaining unfinished at the time of his death. These two works, simultaneously carried on, were insufficient to keep pace with the large and rapid accession of new species with which his collection was enriched, his reputation and his means ensuring him the lion's share of all new arrivals from collectors in various parts of the world. Numbers of short descriptive papers appeared from his pen for many years in the different Natural History periodicals of the metropolis; and he published besides many smaller works in octavo form without figures, on the Hesperidæ and on Equadorian and Bolivian butterflies.

The text which accompanied the various iconographic works which I have described is almost solely confined to the bare descriptions of the species. Of Entomology, as a branch of Biological science, our deceased member seemed to have no conception. In judging, therefore, of his position as an Entomologist,

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we must consider him chiefly as an *iconographer;* but in this useful sphere he was *facile princeps.* I am not aware that he advanced any views as to classification, and he rarely even described new genera. The structural characters of the fascinating objects of his study he for the most part ignored; and it was amusing to those who knew him, to observe how persistently he declined to accept the great aid to classification and estimate of natural affinities afforded by the form of the anterior legs, on which his contemporaries were founding a really natural arrangement of the Diurnal Lepidoptera. In a similar way he set his face against the teachings of Geographical Distribution and the formation of varieties and races under the influence of local conditions. His generally accurate delineation of the nervures arose, not from an appreciation of their real scientific importance, but from their relations to the colours and markings in figuring the species. The serious students of the Order have, however, reason to feel deeply grateful to him for his attention to this feature, especially in the groups Danaïdæ and Heliconidæ.

The death of Mr. Hewitson, as I observed at the commencement of this notice, has caused a distinct void in the Entomological world. His charming residence at Oatlands, where house and grounds displayed so eloquently the pure and refined taste of their owner, who had planned all himself, was a place of occasional resort which many will long feel the loss of. But it is chiefly in the cessation of his published works, of the emulation of which he was the centre and the stimulus to travellers and collectors, which was supplied by his encouragement and expenditure, that will, I fear, for some time to come be felt, in lessened zeal in the study of exotic Lepidoptera.

Two other members whose loss we have to regret are Mr. T. W. Wonfor, of Brighton, and Mr. N. C. Tuely, F.L.S., of Wimbledon Park. Mr. Wonfor, who had only recently been elected, was known chiefly as a Microscopist and contributor in various branches of Zoology to the 'Proceedings of the Brighton and Sussex Natural History Society,' and to other periodicals of general science. Mr. Tuely, whose death has occurred since the commencement of the year, had paid considerable attention to the Diurnal Lepidoptera and contributed notes at various times, including the description of a new species, on the butterflies of the Sandwich Islands, in the 'Entomologist's Monthly Magazine.'

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With these, our obituary record properly closes, but I cannot avoid a passing allusion to the great loss which our science has sustained during the past year, in the death of Professor Stål of Stockholm, who, though not one of our members, was well-known, either personally or by his works, to many of us. An account of of his life and labours has appeared from the pen of Dr. Signoret, in the 'Annals of the Entomological Society of France' for 1878, p. 177, to which I must refer you for authentic details. When Stål visited this country some sixteen years ago, he was known almost solely as a Coleopterist, being then engaged on his important monograph of the American *Chrysomelæ*, but since then he devoted himself with great zeal and success to the study of the Hemiptera. Dr. Signoret gives a list of eighty-seven memoirs which were the result of this indefatigable Entomologist's labours during a period of twenty-five years. According to our associate, Mr. Distant, whose opinion on such a subject carries authority, "Professor Stål's death is the greatest loss that systematic Entomology has sustained for many years."

Turning now to the proper subject of this Address,—the present state and progress of Entomology,—which I regret to be obliged to treat in a very limited and inadequate manner, I will first pass in brief review our own position and labours.

As yon will have learnt from the Council Report, our Society continues to make the steady though slow progress which has marked its career for some years past. The balance between deaths and resignations and new elections leaves the increase on the year of eight members. I find by the valedictory address of M. Reiche, ex-President of the Entomological Society of France, in January, 1878, that our sister Society across the channel has not for some time received any annual increase. The number of members has remained steady at about four hundred, which an experienced observer like M. Reiche considers likely to be the maximum, the gains and losses having balanced each other for several years past. I have no doubt that most of us would be glad to point to a total of four hundred members in our own Society, even with the same drawback of small prospect of increase; but our numbers, even with the considerable augmentation of the last fifteen years, at present barely reaches two hundred and thirty. A Society like ours, constituted on the plan of the old chartered Societies of the metropolis cannot I

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fear, adequately perform its functions with so limited a number of members, unsupported by other aid than that supplied by our moderate subscription. The cost of comfortable West-end lodgings, with capacious room for meetings, and the maintenance of a library, leave a wholly insufficient balance out of an income of £300 a year to spend on publications, which I venture to think are by far the most important part of the work of such a Society as ours. So well is this latter fact understood in Germany, that the Entomological Societies there set forth the publication of papers as their leading object and, acting up to this, they publish volumes, of very respectable bulk, which are given in return for subscriptions less than one-half (in the case of our town members, one-third) of ours. I allude especially to the Societies of Stettin and Berlin, the former of which possesses more than six hundred members and the latter about three hundred and fifty. In the French Society the subscription is nearly as high as ours, and the permanently large numbers is probably due to the high estimation in which its *Annales* are held, for the quantity, excellence, and particularly for the *variety* of their contents. It is the same cause which attracts so many members to the German Societies just mentioned, namely the satisfactory *quid pro quo* which is returned for the subscription. I know it is difficult to effect reforms in matters such as these. There is perhaps only one alteration that could bring about a more satisfactory state of things with us, and that is the introduction into our 'Transactions' of a greater variety of subjects; such as would be likely to attract to our fold the notoriously large number of Entomologists in the United Kingdom who hold aloof from us. We want, besides the excellent papers descriptive of new exotic species which have too exclusively filled our pages, records of observations on the habits, life-histories, and geographical distribution of insects; on local variation, its causes and results; narratives of Entomological excursions and captures; observations on structure, functions and instinct; relations of insects to flowers; and in short, on all such subjects as are interesting to the greater number, as distinguished from descriptive papers which are interesting only to the lesser number. In saying this, I am fully aware of the difficulties that lie in the way of obtaining these good things. Our Secretaries and Council would be very glad to get fairly well-written and original papers on any of these subjects, but they do not come.

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The reason of this, no doubt, lies in a state of things which has often been lamented: namely the too-exclusive devotion of our native Entomologists to the formation of purely British collections. The exhaustion of our limited insular fauna and the extreme unlikelihood of the discovery of new species, seem to teach no lesson to the purely British collector, and he goes on collecting, observing, and recording what has been collected, observed, and recorded over and over again. Some, it is satisfactory to notice, break through the artificial limits imposed by the majority, and extend the range of their excursions and observation to the continent. The ice once broken this way, a boundless field of interesting study lies before them; for, by exchange and a trifling outlay of pocket-money, large collections can be formed and the mind expanded by the study of the whole Palæarctic Fauna, of which that of the British Isles is only a half-starved fragment. Even if it were only for the pleasure of tracing the wonderful local variations, the formation of sub-races and races of our common English insects, some of them of surprising beauty, over the wider continental area, one would think that every intelligent Entomologist with us would be eager thus to extend his studies. And it could be done with no more expenditure of time and very little more of money than the present exclusive pursuit of home productions. Many, of course, would plead that they collect insects only for pure amusement, caring nothing for science. To such we have nothing further to say. But we believe and hope that there are very many British collectors and observers of insects who are able and willing to take a higher view of their pursuit, and if we could only induce a sufficient number of these to take a more general interest in the study, to write papers for us, and join us, the reciprocal good effect which we aim at, viz., the the enlargement and improvement of our 'Transactions,' and thereby the further increase of members and means, would be produced, thus, as we hope, elevating the status of Entomology in this country.

Notwithstanding, however, the smallness of our numbers and means, we have reason to be well-satisfied with our labours during the past year. The monthly meetings have been numerously attended and their interest well kept up. Our 'Transactions,' though rather less in bulk than usual, contain an average number of papers, in which most of the orders of

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Insects are represented, and even the Arachnida and Myriapoda. In the variety, which I have just mentioned as a great desideratum, the volume will be declared superior to many of its predecessors. We have papers by Sir John Lubbock and Mr. Cameron on larvæ of Lepidoptera and Hymenoptera (Tenthredinidæ), with reference to the much-debated subject of protective resemblance. We have also a paper full of interesting observations on the Insects of Southern Africa, by Mr. Mansel Weale; one, of a similar character, by that philosophical observer Dr. Fritz Müller, on Brazilian Butterflies and Moths, and one containing original and suggestive observations on the hairs of some of our British Hymenoptera, by Mr. Edward Saunders. We have further, in the fourth part, just published, an important paper on several hitherto unobserved points of structure and function in the Mantidæ, by Mr. Wood-Mason, whose instructive expositions on this and other subjects have formed an interesting feature of our Evening Meetings throughout the year; and lastly, we have a paper on Economic Entomology by our lady member, Miss Ormerod. The other papers are systematic and descriptive, but one of these may be excepted as including considerations of more general interest than dry description, namely, that of Mr. Butler on the natural affinities of the Lepidopterous family, *Egeriidæ*, in which the novel view is put forth, supported by adduced facts, that the true position of these "clear-winged *Sphingidæ*" is not, as hitherto supposed, near the hawk-moths, but at the other end of the sub-order, between the *Pyrales* and the *Gelechiidæ*. Questions like these, involving the true appreciation of the natural affinities of large groups, are of true scientific importance, and it is to be hoped that Mr. Butler's hypothesis will be well discussed by Lepidopterists.

Abroad, as well as at home, the progress of Entomology appears to me to have been marked by the profusion of published papers on descriptive Entomology rather than by the appearance of works of more important character, such as great monographs or philosophical treatises. This Address would, however, be very incomplete if I were to omit mention of the steady continuation of those two valuable serial works, Mr. W. H. Edwards' 'Butterflies of North America,' of which the 7th part of the 2nd volume has appeared, and which contains a vast and growing mass of original information regarding the life-histories, and especially

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the dimorphic, polymorphic and seasonal variation of species; and Mr. M'Lachlan's monograph of the Trichoptera, which when finished on the plan its author proposes, will be as near as possible a perfect model for this class of works. To these two I might add, as of a similar elevated character, Saussure's 'Melanges Orthopterologiques' and Reuter's Hemiptera, both of which have been continued during the year.

New Entomological Societies still continue to be formed; the latest being that of Munich, in 1877, which already consists of seventy-three members, and publishes its Transactions in half-yearly parts of about eighty pages each, containing beautifully coloured plates, and given for an annual subscription of six shillings. The Museo Civico of Genoa, founded by our eminent associate the Marquis Giacomo Doria, has become, through its handsomely got-up 'Annali,' one of the most considerable of our publishing institutions. The numerous and important papers on our Science appearing in this periodical relate chiefly to the insects of the Eastern Archipelago and Tropical Australia, in which the Genoa Museum is exceedingly rich, owing to the acquisition of part of the large Collection formed by the Count de Castelnau, and the great stores accumulated by Signor D'Albertis during six years of travel in those regions, as well as part of Dr. Beccari's collection made in New Guinea and the neighbouring islands. The authorities of the museum have had the wisdom to entrust the examination and description of these collections to the specialists of different countries, and hence their 'Annali' have been enriched with a series of excellent monographs of many difficult minor groups; and their museum has been increased in value and importance by the accurate naming of the species.

It is not my intention to review in further detail the Entomological literature of the year, information regarding which the earnest student will naturally seek for, not in a general notice like the present, but in the Zoological Record and similar exhaustive works. As in previous years its collective volume is immense. But if we except a few contributions of limited extent, on subjects of general biological interest, similar to those I have named from our own Transactions,—such as Sir John Lubbock's elaborate and instructive experiments on the mental qualities of ants, bees, and wasps (of which a continuation has appeared in

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No. 75 of the 'Linnæan Journal'); Mr. Herbert Goss's papers on Fossil Entomology (in the Entomologist's Monthly Magazine); the observations by Mr. J. E. Fletcher and Mr. P. Cameron (in the same periodical), confirmatory of Dr. Adler's disputed statements as to alternation of generations in the *Cynipidæ*; and the valuable review of the present state of our knowledge of the senses of insects in the 'Mittheilungen des Müncher Entomologischen Vereins' (1878, p. 1), by Dr. Forel,—the mass of printed matter of the year relates to purely systematic Entomology, to genera, species and varieties, and their technical characters. After glancing over a large number of the publications of 1878, and examining in detail some of the principal papers, I think I am not wrong in making the observation that there is a growing tendency in describers to confine themselves to their trade of mere description, and to neglect those general remarks on distribution, natural affinities, and even classification which we used formerly to see very generally at the head of descriptive papers. A describer now generally gives us nothing but his diagnoses and descriptions, the size, sex and locality of his specimens, and appears then satisfied: he has secured what he calls his "types," which he and his fellow-specialists then value so much more highly than undescribed specimens. We have not even had so much this year of those discussions which used to occupy so large a space on nomenclature, and the results of work done in searching for reasons for changing names—or changing them back again. I have met, however, with two or three papers on this subject, and in regard to them I am tempted, in passing, to make a quotation. In one of these papers, after reading over logical arguments adduced for altering many names that have been in universal use, in some cases for eighty years, I came at last to a species about which the author says—"Il n'y a pas de motifs pour changer ce nom;" "there are no reasons for changing this name!" This was something to be thankful for; he would be glad to find an excuse for changing the name, but could not: I quote the expression, as it seems to throw light on the spirit which animates this class of workers in our science.

But reverting to the prevailing exclusively descriptive character of the Entomological literature of the day, I think a reason for it may probably be found in the constantly increasing magnitude of the task of the describer or the general collector—a task imposed

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on him by the prodigious influx of new species from countries year by year opened up by the growing facilities of communication and travel. The world for the Entomologist is larger than it used to be, and Nature proves to be a hundred times more prolific and varied in her forms than used to be thought possible. Thus our best working Entomologists are led to abandon general views, both from lack of time to work them out, and the consciousness that general views on the relations of forms and faunas are liable to become soon obsolete by the rapid growth of knowledge. I will cite a few instances, to show how naturally this result is brought about. A passing reference need only be made to tropical countries, which yield a continued stream of species and genera previously unknown, the affinities of which are a puzzle requiring long study to unravel. A more instructive case is that of Australia, the number of whose known insect productions, especially Coleoptera, has prodigiously increased during the last ten years, the new discoveries necessitating a revision of the views previously entertained regarding the nature of the fauna of this part of the world. In the family *Carabidæ*, which has been better worked than most others, the recent additions amount to hundreds of species, having often a near, but very peculiar, relationship to forms of the same family in North Temperate Regions. It could never have been anticipated that, next to the Palæarctic Region, Australia would be richest in species and genera of the great *Feronia* group in this family, and all generalizations on the subject ten years ago would therefore have been since falsified. It is the same with many Oceanic Islands. Ten years ago, with regard to New Zealand, the statement was acquiesced in that these islands had an extremely scanty insect Fauna, and that what they did possess belonged to the Australian type. You may all have remarked how large a part of our own 'Transactions,' and other periodicals of the Metropolis, has of late years been occupied by descriptions of New Zealand insects; the known number of which is still rapidly increasing, thanks to the researches of persevering collectors, like Hutton, Brown, Wakefield, Fereday, and Lawson. According to our present knowledge, the Insect Fauna is quite distinct from that of Australia, and its origin must be accounted for by a totally distinct set of causes.—Again; an isolated oceanic rock like St. Helena, when examined by a skilled Entomologist like our

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late honoured associate Wollaston, yields its unexpected tribute of new forms by the score—forms so anomalous, especially in the genus *Bembidium* and in the *Cossonidæ* and *Anthribidæ*, that their discovery introduces quite a new element into our studies. I may say the same of the Sandwich Islands, the Coleoptera of which are now being investigated seriously for the first time by the Rev. T. Blackburn. Already some dozens of new forms have been discovered, whose relationships to those of other parts of the world form a most intricate problem. What has thus been done in the last two or three years in two Oceanic Islands, like St. Helena and Oahu of the Sandwich group, will surely be repeated in scores of other islands of the same class, whenever they shall be visited by intelligent and industrious collectors. Thus here, as in tropical regions and in Australia, new material arrives faster than it can be digested; and Entomologists limit themselves for the present to describing it. Much as they have been discussed, the nature and origin of the Faunas of Oceanic Islands have not yet been satisfactorily explained; and after the general principles have been settled, the modifications will have to be studied which have produced the specialities of each separate case. But when these principles are settled, they will throw more light on the origin of species and the adaptation of their structure and instincts to new conditions than any other branch of investigation.

I have entered into these details with a view to explain, in some manner, why all our principal systematists confine themselves, as I believe they do, more strictly than was formerly the case to the mere description of species and genera. But I do not excuse them; on the contrary, I think it is a loss to science that systematists—or those who devote that minute study to structure and relationship which is required to enable them to classify and describe their collections—fail to give us those general results of their observations which would throw light on the genetic relations of forms. This subject lies at the foundation of the greatest problem in Biological science,—that of evolution,—and none but systematists, such as I have just described, are in a position to work it out.

All our knowledge of natural affinity in Biology, or the true blood-relationship of forms, has been due to the labours of systematists and "species-describers" not always consciously,

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but through their endeavours, persisted in with prodigious industry and keenness, to discover characters which may enable them to classify satisfactorily the objects of their study. It has fortunately happened that the instinctive perception of truth (less clear and strong in some than in others) has been such that no classification has satisfied them, until it has become a natural one: thus without knowing it, or intending it, their labours have gradually tended to the abandonment of artificial systems and the discovery of arrangements which express the true genetic relations of forms.

This end, however,—a natural classification,—has only been worked out in a general way, seldom in the minor groups or families, or even in the orders, and to attain this is the task which it is incumbent on the systematic Entomologist to accomplish.

It was my intention to have continued this subject a little further, and to have said a few words on the difference between the systematic and physiological value of characters; also on the error which systematic Entomologists commit in undervaluing and putting out of sight those characters which, although indicative of relationship, fail to satisfy their need of means to define their groups absolutely; as modern Coleopterists have done, for instance, with regard to the tarsal system. I had also intended to point out certain groups of insects in which a satisfactory natural arrangement has been nearly attained, and to have cited an instance in which it could be shown that the work had been done solely by systematists. But time has failed me, and I am compelled to bring this somewhat discursive Address to a close.

It remains only to thank you for the indulgent consideration you have shown to my shortcomings, and the uniform loyalty you have displayed during the period of my occupation of the Presidential chair; and to congratulate you on the choice of a successor under whose auspices the Society will continue with fresh vigour its career of solid usefulness.

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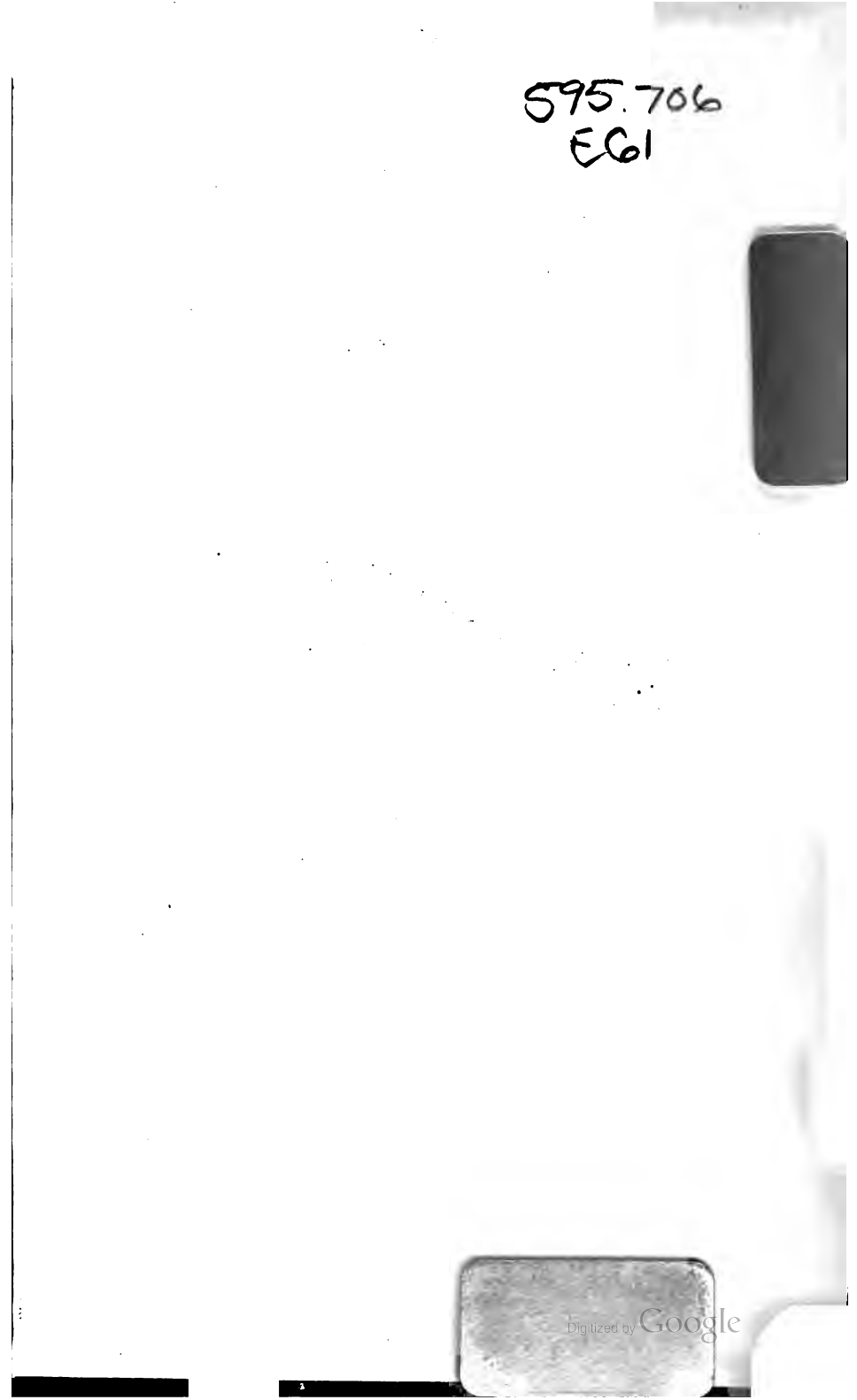

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